

# Chemical Age

Levington  
Research  
Station Opened  
(page 795)

VOL. 77 No. 1974

11 May 1957

*"Fluor acid air is procured by dissolving the earthy substance called fluor in vitriolic acid.*

*This kind of air extinguishes a candle and, like vitriolic air, one measure of it saturates two of alkaline air. It is peculiar to this kind of air to dissolve glass when it is hot.*

*It seems to consist of a peculiar acid vapour, united to the strong substance of the fluor; for water being admitted to it absorbs the acid vapour, and the stony substance is deposited. By this means it exhibits an amusing appearance, whether water be admitted to a glass jar previously filled with that air, or the bubbles of air be admitted, as they are formed, to a quantity of water resting on mercury."*



## ... an amusing appearance

So, in 1797, Joseph Priestley described his early observations on hydrofluoric acid to students at the New College in Hackney, and recorded them under the title of *Heads of Lectures on a Course of Experimental Philosophy*. Today, using fluor acid air dissolved in aqua destillata, and costly vessels of silver and platinum, B.D.H. chemists make vast quantities of

a great variety of fluorides of high purity, free from all stony substances, for which the B.D.H. sales departments will happily quote for deliveries by the pound, the cwt. or the ton.

Such fluorides are used industrially for all sorts of purposes from increasing the light transmitting properties of lenses to aiding the production of atomic energy.

## B.D.H. LABORATORY CHEMICALS

THE BRITISH DRUG HOUSES LTD. B.D.H. LABORATORY CHEMICALS GROUP POOLE DORSET  
LC/P/15v

# COLVIN-SMITH

## PIPEWORK

*for*

CHEMICAL PLANTS

BOILER HOUSE PLANTS

REFINERIES, POWER STATIONS

PAPER MILLS, FACTORIES AND SHIPS

DESIGNED, FABRICATED, ERECTED OR INSTALLED

COLVIN-SMITH LTD., SOUTH SHORE ROAD, GATESHEAD-ON-TYNE 8. Telephone 73544/5/6



HERE'S DURABILITY

ACCURACY

STAINLESS STEEL  
BOLTS • NUTS • STUDS  
ACID AND HEAT RESISTING

We are specialists in the manufacture of Bolts, Nuts, Studs and Machined Parts in all classes of Heat-Resisting and Stainless Steels.

THE SANDIACRE SCREW CO. LTD  
SANDIACRE • NEAR NOTTINGHAM  
PHONE • SANDIACRE 2065/6 • GRAMS • SCREWS, SANDIACRE

All products are machined from bar materials.

# IPTE

***A low-boiling ether of low water solubility***

***for extraction and other industrial purposes.***



**Shell Chemical Company  
Limited**

Marlborough House, 15/17 Great Marlborough Street, London, W.1.  
Telephone : GERnard 0666

Sales Offices :  
| LONDON: Walter House, Bedford Street, W.C.2. Tel: Temple Bar 4455.  
| MANCHESTER: 144-146 Deansgate. Tel: Deansgate 6451.  
| BIRMINGHAM: 14-20 Corporation Street, 2. Tel: Midland 6954-8.  
| GLASGOW: 124 St. Vincent Street, C.2. Tel: Glasgow Central 9561.  
| BELFAST: 35-37 Boyne Square. Tel: Belfast 20081.  
| DUBLIN: 53 Middle Abbey Street. Tel: Dublin 45775.

# COLVIN-SMITH

## PIPEWORK

*for*

CHEMICAL PLANTS  
BOILER HOUSE PLANTS  
REFINERIES, POWER STATIONS  
PAPER MILLS, FACTORIES AND SHIPS  
DESIGNED, FABRICATED, ERECTED OR INSTALLED

COLVIN-SMITH LTD., SOUTH SHORE ROAD, GATESHEAD-ON-TYNE 8. Telephone 73544/5/6



HERE'S DURABILITY

HERE'S ACCURACY

STAINLESS STEEL  
BOLTS • NUTS • STUDS  
ACID AND HEAT RESISTING

We are specialists in the manufacture of Bolts, Nuts, Studs and Machined Parts in all classes of Heat-Resisting and Stainless Steels.

THE SANDIACRE SCREW CO. LTD  
SANDIACRE • NEAR NOTTINGHAM  
PHONE • SANDIACRE 2065/6 • GRAMS • SCREWS, SANDIACRE

All products are machined from bar materials.



# IPE

**A low-boiling ether of low water solubility**

**for extraction and other industrial purposes.**



**Shell Chemical Company  
Limited**

Marlborough House, 15/17 Great Marlborough Street, London, W.1.  
Telephone : GERrard 0666

Sales Offices :  
| LONDON: Walcer House, Bedford Street, W.C.2. Tel: Temple Bar 4455.  
| MANCHESTER: 144-146 Deansgate. Tel: Deansgate 6451.  
| BIRMINGHAM: 14-20 Corporation Street, 2. Tel: Midland 6954-8.  
| GLASGOW: 124 St. Vincent Street, C.2. Tel: Glasgow Central 9561.  
| BELFAST: 35-37 Boyne Square. Tel: Belfast 20061.  
| DUBLIN: 53 Middle Abbey Street. Tel: Dublin 45775.

# INDEX TO ADVERTISERS

The first figures refer to advertisement in Chemical Age Year Book, the second to the current issue

Page		Page		Page		Page		Page	
229	A.P.V. Co., Ltd., The	—	227	British Steam Specialties Ltd.	—	280	Douglas, William, & Sons Ltd.	—	
344	Acalor (1948) Ltd.	—	168	British Tar Products Ltd.	—	200	Dowling Lime & Stone Co., Ltd., The	—	
209	Accrington Brick & Tile Co., Ltd., The	—	170	British Thomson-Houston Co. Ltd.	—	—	Dring & Fage Ltd.	—	
176	Adequate Weighers Ltd.	—	397	Broadbent, Thomas, & Sons, Ltd.	—	174	Drummond Patents Ltd.	—	
—	Aero Research Ltd.	—	231	Brotherhood, Peter, Ltd.	—	195	Dryden, T., Ltd.	—	
223	Aimer Products Ltd.	—	244	Brotherton & Co., Ltd.	—	—	Dunlop Rubber Co. Ltd.	—	
159	Albany Engineering Co. Ltd. The	—	—	Brough, E. A., & Co., Ltd.	—	—	Dutt, P. K., & Co., Ltd.	—	
—	Alexander, Herbert, & Co., Ltd.	—	234	Browns Foundry Co., Ltd.	—	232	E.C.D., Ltd.	—	
165	Allen, Edgar, & Co., Ltd.	—	218	Brush Design Group, The	—	330	Edison Swan Electric Co., Ltd., The	—	
364	Alumina Co., Ltd., The	—	175	Bryan Donkin Co., Ltd., The	—	268	Electronic Switchgear (London) Ltd.	—	
328	Amalgamated Oxides (1939) Ltd.	—	180	Buell (1952) Ltd.	—	244	Electrothermal Engineering Ltd.	—	
306	Armour & Co., Ltd.	783	272	Burnett & Rolfe Ltd.	—	B/Mk.	Elliott, H. J., Ltd.	—	
G/Cd.	Ashmore, Benson, Pease & Co.	—	—	Butterworths Scientific Publications	—	—	Enamelled Metal Products Ltd.	—	
189	Ashworth, Arthur, Ltd.	—	201	Butterfield, W. P., Ltd.	—	166	English Glass Co., Ltd., The	786	
—	Associated Lead Mfrs. Ltd.	—	160	Calder Vale Glassworks Ltd.	—	G/Cd.	Erinoid Ltd.	—	
G/Cd.	Audley Engineering Co., Ltd.	—	—	Callow, F. E. (Engineers) Ltd.	—	207	Evered & Co., Ltd.	—	
146	Autometric Pumps Ltd.	—	—	Callow Rock Lime Co. Ltd. The	—	208	Farnell Carbons Ltd.	—	
212	B. A. Holland Engineering Co., Ltd., The	—	354	Candy Filter Co., Ltd., The	—	—	Fawcett Finney Ltd.	—	
—	Baker Perkins Ltd.	785	238	Carbon Dioxide Co., The	—	202	Ferris, J. & E., Ltd.	—	
324	Baker Platinum Division, Engelhard Industries Ltd.	—	280	Carmichael, John R., Ltd.	—	—	Fleischmann (London) Ltd.	—	
233	Balfour, Henry, & Co.	—	243	Catalin Ltd.	—	220	Film Cooling Towers (1925) Ltd.	—	
210	Barclay Kellett & Co., Ltd.	—	—	Chapman & Hall Ltd.	—	253	Foxboro-Yoxall Ltd.	—	
250	Bennett, Sons & Shears Ltd.	—	191	Chemical Construction Co.	—	—	Fraser, W. J., & Co., Ltd.	—	
G/Cd.	Berk, F. W., & Co., Ltd.	—	—	Chemical Workers' Union, The	—	298	Fuller's Earth Union Ltd., The	—	
242	Beryllium & Copper Alloys (Safety Tools) Ltd.	—	—	Chemicals & Feeds Ltd.	—	188	Gallenkamp, A., & Co., Ltd.	—	
—	Bivac Air Co. Ltd.	—	318	Chemitrade Ltd.	—	—	Gas Council, The	—	
270	Black, B., & Son, Ltd.	—	284	Chesterfield Tube Co., Ltd., The	—	266	Geigy Pharmaceutical Co., Ltd.	—	
204	Blundell & Crompton Ltd.	—	203	Ciech (Poland)	cov. iii	—	General Electric Co., Ltd.	—	
148	Borax Consolidated Ltd.	—	264	Cinema Television Ltd.	—	—	Glebe Mines Limited	—	
—	Borax & Chemicals Ltd.	—	224	Clark, T. C., & Co., Ltd.	—	290	Graviner Mfg. Co. Ltd.	—	
289	Boulton, William, Ltd.	—	—	Classified Advertisements	814, 815	265	Grazebrook, M. & W., Ltd.	—	
228	Bowmans Chemicals Ltd.	—	258	Clayton Dyestuffs Co. Ltd. The	—	164	Greeff, R. W., & Co., Ltd.	—	
270	Braby, Fredk., & Co., Ltd.	—	199	Clayton, Son & Co., Ltd.	—	192	Grindley & Co., Ltd.	—	
183	Bramigk & Co., Ltd.	—	288	Clydesdale Chemical Co. Ltd.	—	232	Hackbridge & Hewitt Electric Co., Ltd.	—	
—	British Acheson Electrodes Ltd.	—	285	Clyde Tube Forgings Ltd.	—	202	Haller & Phillips Ltd.	—	
224	British Arca Regulators Ltd.	—	213	Cole, R. H., & Co., Ltd.	—	214	Hanovia Lamps	—	
217	British Carbo Norit Union Ltd.	—	208	Cole & Wilson Ltd.	—	—	Hanson Books	—	
—	British Ceca Co., Ltd., The	—	204	Collins Improved Firebars Ltd.	—	206	Harris (Lostock Gramam) Ltd.	—	
216	British Chrome & Chemicals Ltd. (London)	—	—	Colt Ventilation Ltd.	787	222	Haworth, F. (A.R.C.) Ltd.	—	
230	British Chrome & Chemicals Ltd. (Lancs)	—	348	Comet Pump & Eng. Co. Ltd. The	cov. ii	158	Hearson, Charles, & Co., Ltd.	—	
—	British Drug Houses Ltd., The	—	—	Constable & Co.	—	238	Herbert, Alfred, Ltd.	—	
—	British Geon Limited	Front cov.	—	Controlled Convection Drying Co.	791	—	Hickson & Welch Ltd.	788	
8	British Industrial Solvents	—	—	Costain-John Brown Ltd.	—	193	Holroyd, John, & Co., Ltd.	—	
236 & 237	British Laboratory Ware Association Ltd.	—	4	Crofts (Engineers) Ltd.	—	234	Honeywill & Stein Ltd.	—	
275	British LaBour Pump Co., Ltd.	—	—	Cromil & Piercy Ltd.	—	248	Hopkin & Williams Ltd.	—	
240	British Lead Mills Ltd.	—	171	Cruickshank, R., Ltd.	—	187	Humphreys & Glasgow Ltd.	—	
360	British Railway Traffic & Electric Co., Ltd.	—	334	Curran, Edward, Engineering Ltd.	—	310	Huntington, Heberlein & Co. Ltd.	—	
Spine	British Resin Products Ltd.	—	304	Cyanamid Products Ltd.	—	—	I.C.I. Billingham Organic	—	
172	British Rototherm Co. Ltd. The	—	222	Cyclops Engineering Co. Ltd. The	—	—	I.C.I. General Chemicals Florube	—	
—	—	—	288	Cygnat Joinery Ltd.	—	—	I.C.I. Plastics—Darvic	—	
—	—	—	286	Danks of Netherton Ltd.	—	—	I.C.I. Plastics—Fluon.	—	
—	—	—	216	Davey, Paxman & Co., Ltd.	—	—	I.C.I. Ltd., (Plastics Div.) Corvic	—	
—	—	—	170	Dawson, McDonald & Dawson Ltd.	—	157	Imperial Chemical Industries Ltd.	—	
—	—	—	161	Derby Luminescents Ltd.	—	—	Imperial Smelting Corporation (Sales) Ltd.	—	
—	—	—	—	Dorr-Oliver Co., Ltd.	790	—	—	—	

[continued on page 784]



**"ZULO"**

**LEIGH & SONS METAL WORKS**

Orlando LTD.  
St., BOLTON

**CARBOY HAMPERS**

**CARBOYS • PACKED CARBOYS  
CARBOY FILTERS AND BARROWS  
SAFETY CRATES TOP PROTECTORS**

SPECIALISTS IN

## BULK LIQUIDS TRANSPORT

ACIDS • OILS • SPIRITS  
AND GENERAL CHEMICALS

**HAROLD WOOD & SONS LTD.**

**Wormald St • Heckmondwike**

Tel.: Heckmondwike 1011/5    Telegraph: 'Transport' Heckmondwike

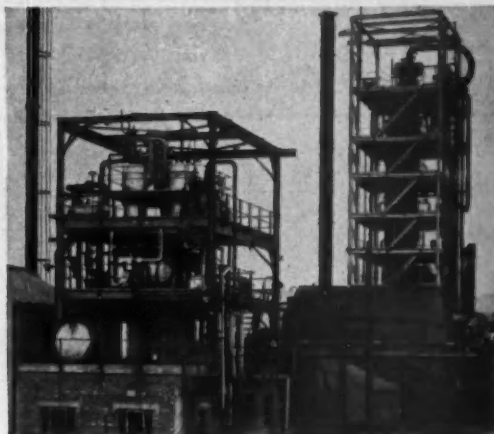
Temporary London Area Office: Foundry Cottage, Orsett, Grays.

Tel: Orsett 473

SOME OF THE

# ARMOUR CHEMICALS

NOW MADE IN BRITAIN



★ Primary Amines $RNH_2$	WHERE R IS	SOME TYPICAL APPLICATIONS	LITERATURE TO ASK FOR
ARMEEN 12D	pure lauryl	Intermediate for textile chemicals, quaternaries.	Armeens, L-12
ARMEEN T	technical oleyl, stearyl	Wax emulsions. Waterproofing, flotation.	F-2
ARMEEN HT	technical stearyl, palmityl	Hard rubber mould release, bitumen additive.	Armeens, L-12
ARMEEN HTD	pure stearyl, palmityl	Rubber industries. Fertilizer industry, anti-static.	L-3
ARMEEN 18D	pure stearyl	Boiler condensate control, intermediate for textile chemicals.	Armeens, L-2
ARMEEN C	pure lauryl, myristyl	Petroleum industry, corrosion inhibition. Pigment manufacture, paint industry.	G-3, G-5 L-7
★ Secondary Amines $R_2NH$			
ARMEEN 2C	technical lauryl, myristyl	For manufacture of quaternaries soluble in oils, etc., dispersible in water.	Armeens
ARMEEN 2HT	technical stearyl	Corrosion inhibition.	Arquads
★ Diamines $R.NH.C_3H_6NH_2$			
DUOMEEN T	technical oleyl, stearyl	Road making. Paper, Waterproofing, surface coatings.	C-2/3 Duomeens
DUOMEEN CD	pure lauryl, myristyl	Epoxy resins. Corrosion inhibition.	C-3/L/1 L-15
DUOMEEN T DIOLATE	technical oleyl, stearyl	Metal working, wire drawing. Paints, caulking compounds, pigments.	G-4, L-14 L-4, L-8
Water Soluble Quaternaries $[R.(CH_3)_3N]^+ Cl^-$			
ARQUAD 12	pure lauryl	Foam rubber. Emulsifier.	L-5
ARQUAD 18	pure stearyl	Anti-static for plastic.	L-11
ARQUAD C	technical lauryl, myristyl	Germicide, cosmetics, road emulsions. Textile industry.	E-5 G-2
Oil Soluble Water Dispersible Quaternaries $[R_2(CH_3)_2N]^+ Cl^-$			
ARQUAD 2C	technical lauryl, myristyl	Corrosion inhibitor, petroleum production. Internal anti-static, germicide. Insecticide and other emulsifiers. Slip aid in transparent viscose films, etc.	E-3, E-6, G-3 E-5 E-4, F-2
ARQUAD 2HT	pure stearyl, palmityl	Laundry & textile softener. Starch industry. Paper industry.	E-1 E-8 E-1

★ Each of these is also available in its water-soluble acetate form: ask for booklet on ARMACS

ARMOUR & COMPANY LTD., CHEMICAL DIVISION, LINDSEY ST., LONDON, E.C.1  
CLERKENWELL 9011





# INDEX TO ADVERTISERS

The first figures refer to advertisement in Chemical Age Year Book, the second to the current issue

Page	Page	Page	Page	Page	Page
International Combustion Group	—	Mirreles Watson & Co. Ltd. The	789	Simon, Richard, & Sons, Ltd.	788
Interscience Publishers Ltd.	804	180 Mirvale Chemical Co., Ltd.	—	Southern Instruments Computer	—
Isopad Ltd.	—	254 Mitchell, Cotts & Co., Ltd.	—	Division	—
246 Jackson, Henry (Liverpool) Ltd.	—	Mond Nickel Co., Ltd., The	—	338 Spencer Chapman & Messel Ltd.	—
214 Jackson, J. G., & Crockatt Ltd.	—	Monsanto Chemicals Ltd.	—	Stabilag Co., Ltd., The	—
245 Jenkins, Robert, & Co., Ltd.	—	Morgan Crucible Co., Ltd., The	—	396 Stanton Instruments Ltd.	—
249 Jenkinson, W. G., Ltd.	—	200 Moritz Chemical Engineering	—	Staveley Iron & Chemical Co. Ltd.	—
3 Jobling, James A., & Co., Ltd.	—	Co., Ltd.	—	212 Steel, J. M., & Co., Ltd.	—
Johnson, S. H., & Co., Ltd.	—	181 Neckar Water Softener Co. Ltd.	—	Stockdale Engineering Co., Ltd.	786
166 Johnsons of Hendon Ltd.	—	268 Nederlandse Emballage Onderneming Gebr. de Wilde N.V.	—	Stonehouse Paper & Bags Mills	—
267 Jones, Tate & Co., Ltd.	—	221 Negretti & Zambra Ltd.	—	Streamline Filters Ltd.	—
228 K.D.G. Instruments Ltd.	—	New Metals & Chemicals Ltd.	—	Sturge, John & E., Ltd.	—
178 K.W. Chemicals Ltd.	—	Newnes, George & Co. Ltd.	—	251 Sutcliffe Speakman & Co., Ltd.	—
Kaylene (Chemicals) Ltd.	—	276 & 277 Newton Chambers & Co. Ltd.	—	279 Taylor Rustless Fittings Co. Ltd.	—
2 Keith Blackman Ltd.	—	239 Nicolson, W. B. (Scientific	—	235 Tenaplas Sales Ltd.	—
278 Kernick & Son Ltd.	—	Instruments) Ltd.	—	218 Thermal Syndicate Ltd., The	—
395 Kestner Evaporator & Engineering	—	177 Nordac Ltd.	—	196 Thomas & Bishop Ltd.	—
Co., Ltd. (Industrial Safety)	—	211 North Thames Gas Board	—	Thomason, W., & Sons Ltd.	—
395 Kestner Evaporator & Engineering	—	194 Northern Malleable Foundry	—	145 Thompson, John (Dudley) Ltd.	—
Co., Ltd.	790	Co., Ltd., The	—	Todd Bros. (St. Helens &	—
Key Engineering Co. Ltd. The	—	179 Northey Rotary Compressors Ltd.	—	Widnes) Ltd.	—
283 Kier, J. L., & Co., Ltd.	—	Nu-Swift Ltd.	—	198 Towers, J. W., & Co., Ltd.	—
271 Kleen-e-ze Brush Co., Ltd.	—	296 Palfrey, William, Ltd.	—	197 Trent Valve Co., Ltd.	—
206 Lankro Chemicals Ltd.	—	Paper Goods Manufacturing	—	160 Tungstone Products Ltd.	—
210 Laporte Chemicals Ltd.	—	Co., Ltd.	—	259 Unifloc Ltd.	—
184 Lavino (London) Ltd.	—	Pascall Engineering Co. Ltd. The	786	Unilever Ltd.	810
252 Leda Chemicals Ltd.	—	6 Paterson Engineering Co. Ltd. The	—	United Coke & Chemicals Co. Ltd.	—
264 Leek Chemicals Ltd.	—	287 Peabody Ltd.	—	247 United Filters & Engineering Ltd.	—
162 Leigh & Sons Metal Works Ltd.	782	Penrhyn Quarries Ltd.	—	United Kingdom Atomic Energy	—
Lennig, Charles, & Co. (Great	—	320 & 368 Permutit Co., Ltd., The	—	Authority	—
Britain) Ltd.	—	G/Cd. Petrocarbon Developments Ltd.	—	Vaughan Crane Co. Ltd.	—
Lennox Foundry Co., Ltd.	—	Petrochemicals Ltd.	—	192 W.E.X. Traders Ltd.	—
Lewis, H. J., & Co., Ltd.	805	340 Pool, J. F., Ltd.	—	241 Walker Extract & Chemical Co. Ltd.	—
219 Light, L., & Co., Ltd.	789	Pott, Cassels & Williamson	—	Wallach Bros. Ltd.	791
274 Lind, Peter, & Co., Ltd.	—	358 Powell Duffryn Carbon Products Ltd.	—	263 Waller, George & Son Ltd.	—
Cover London Aluminium Co. Ltd. The	—	G/Cd. Power-Gas Corporation, Ltd. The	cov. iv	161 Walley, A. L.	—
Longman Green & Co. Ltd.	—	169 Price Stutfield & Co., Ltd.	—	162 Wallis, Charles, & Sons (Sacks) Ltd.	—
278 Lord, John L., & Son	—	Prodorite Ltd.	—	Ward, Thos. W., Ltd.	—
190 Machinery (Continental) Ltd.	—	242 Production Chemicals (Rochdale)	—	185 Watson, Laidlaw & Co., Ltd.	—
257 Mallinson & Eckersley Ltd.	—	Ltd.	—	260 Wells, A. C., & Co., Ltd.	—
Manesty Machines	—	261 Pye, W. G., & Co., Ltd.	—	182 Wengers Ltd.	—
342 Marchon Products Ltd.	—	Pyrethrum Board of Kenya	792	217 Whessoe Ltd.	—
226 Marco Conveyor & Eng. Co. Ltd.	—	Q.V.F. Ltd.	—	196 Whitaker, B., & Sons Ltd.	—
168 Matthews & Yates Ltd.	—	314 Reads Ltd.	—	163 Widnes Foundry & Engineering	—
May & Baker Ltd.	—	Richmond Welding Co., Ltd.	—	Co., Ltd.	—
173 Measuring & Scientific Equip-	—	Robinson, F., & Co., Ltd.	—	Wilkinson, James, & Son, Ltd.	—
ment Ltd.	—	G/Cd. Rose, Downs & Thompson Ltd.	—	186 Wilkinson Rubber Linatex Ltd.	—
Cover Metal Containers Ltd.	—	230 Rotometer Manufacturing Co. Ltd.	—	273 Willcox, W. H., & Co., Ltd.	—
Metalfiltration Co., Ltd.	816	167 St. Helens Cable & Rubber Co. Ltd.	—	194 Williams, & James (Eng.) Ltd.	—
G/Cd. Metalock (Britain) Ltd.	—	269 Sandiacre Screw Co., Ltd., The	cov. ii	172 Wilson, Edward, & Son Ltd.	—
174 Metcalf & Co.	—	182 Scientific Glass-Blowing Co. The	—	268 Wilde, Gebr. De Nederlandse	—
Metropolitan - Vickers Electrical	—	285 Shaw Petrie Ltd.	—	Emballage Onderneming N.V.	—
Co., Ltd.	—	255 Sheepbridge Alloy Castings Ltd.	—	220 Wood, Harold, & Sons Ltd.	782
178 Middleton & Co., Ltd.	—	356 Shell Chemical Co., Ltd.	781	184 Worcester Royal Porcelain Co.,	—
Miller, P. L.	813	256 Siebe, Gorman & Co., Ltd.	—	Ltd., The	—
Mills Packard Construction Co. Ltd.	—	350 Sigmund Pumps Ltd.	—	Worthington-Simpson Ltd.	—
215 Mine Safety Appliances Co. Ltd.	—			281 Wynn (Valves) Ltd.	—
				225 Yorkshire Tar Distillers Ltd.	—
				226 Zeal, G. H., Ltd.	—

## The Classification of Fire Hazards and Extinction Methods

By JAMES D. BIRCHALL

8s. 3d. [postage paid]

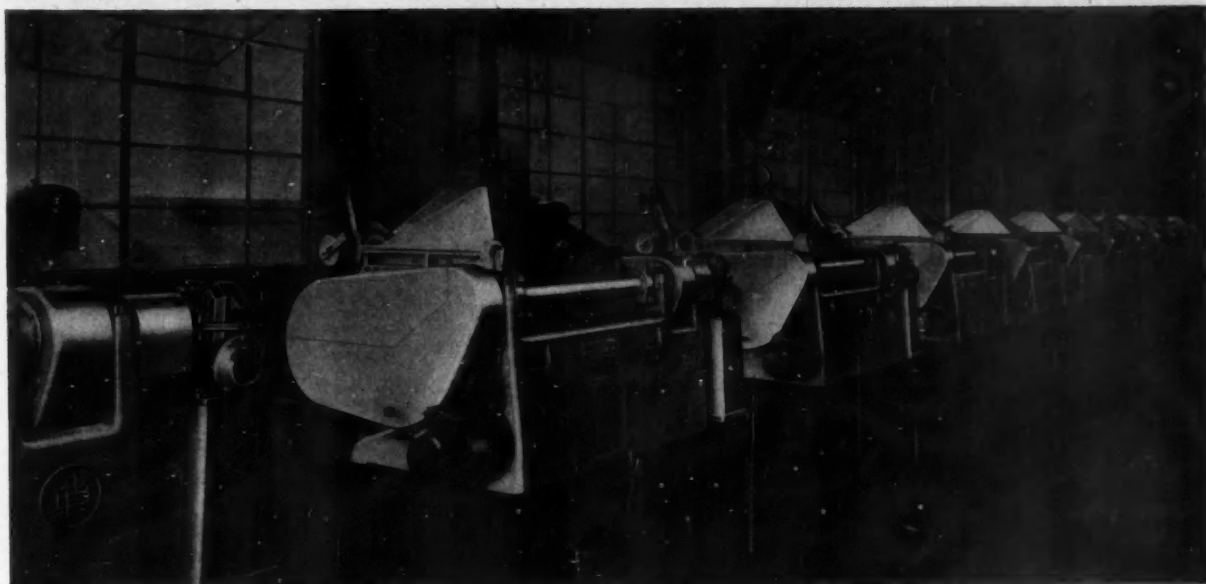
NEW FIRE HAZARDS are increasing with the rapid expansion of certain chemical industries, notably in the field of plastics. The nature of these hazards has been explored in this book, which gives classified lists of substances and extinction agents, and detailed analyses and conclusions based on these tables. This information about chemicals, plastics, dust, and liquids is of the utmost use in every industry where new risks are attendant on the employment of new materials.

Published by **ERNEST BENN LIMITED**  
Bouverie House • Fleet Street • London • EC4



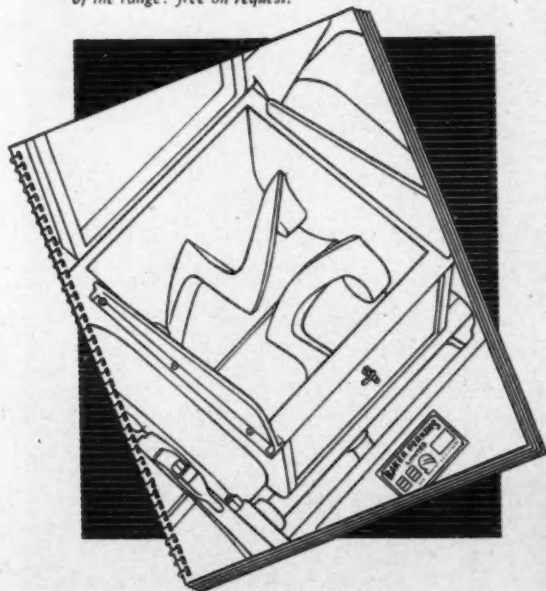


# UNIVERSAL MIXING MACHINES

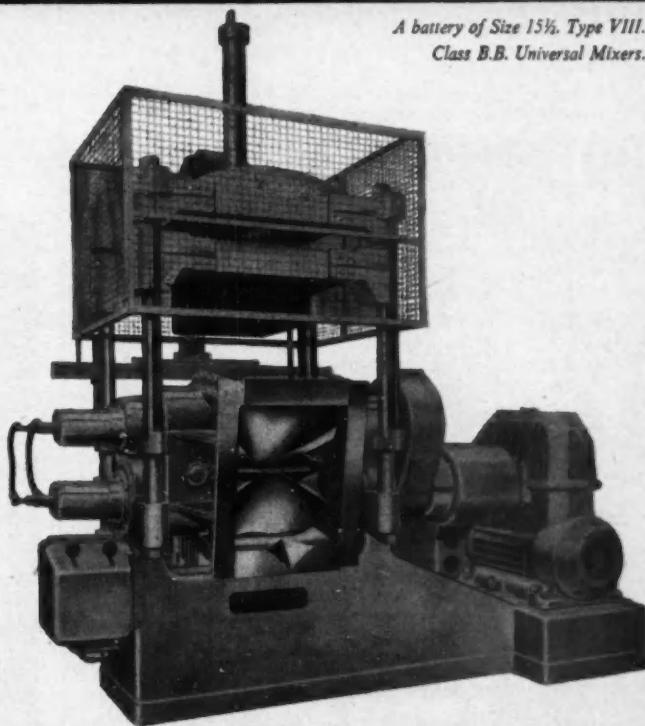


Whatever your mixing requirements may be Baker Perkins can offer you authoritative and objective guidance, deriving from 75 years experience in the vast field in which mixing forms part of industrial processes. They advise on familiar problems and experiment to solve new ones equally without fee or obligation.

★ This booklet illustrates and describes Universal Mixing Machines in types, sizes and capacities characteristic of the range. free on request.



*A battery of Size 15½, Type VIII.  
Class B.B. Universal Mixers.*



*Size 12 Universal Heavy Duty  
Mixer for Rubber and Plastics.  
Capacity per mix 9 Imp. gallons,  
H.P. 40.*

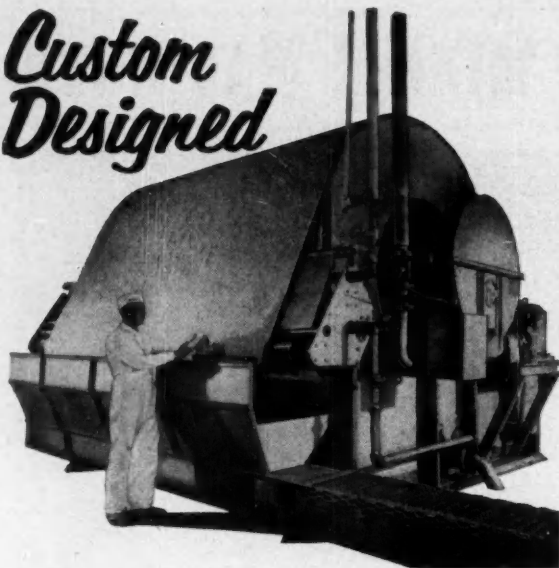
*Fully jacketed for temperature  
control and with pressure ram  
actuated hydraulically or pneu-  
matically as preferred.*

## BAKER PERKINS

*Engineers*

WESTWOOD WORKS - STAMFORD, ENGLAND

# Custom Designed



## For a Bigger Yield

Higher yield in your case may mean cleaner, dryer cake . . . or better recovery of solubles . . . or just plain fast, trouble-free operation on a job that's got to be done. If you can get a few points better efficiency at no extra cost, why not?

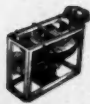
FEinc custom-designed continuous vacuum filters have been doing just this for 37 years: For instance:

- Replaced six settling tanks in recovering plastic grinding waste . . . paid for itself in 3 months.
- Reduced moisture in iron pigment from 68 to 59 per cent.
- Cut recycling of difficult gelatinous sulphate cake from nine to five cycles.
- Eliminated plugging, gave three hours more running time daily on sticky clay.
- Reduced solubles in metallic stearate from 0.5 to 0.05 per cent.
- Recovered  $\frac{3}{4}$  of chromates left by competitive filter.

All types of continuous rotary vacuum filters . . . string, horizontal, scraper, precoat, etc. . . . are custom designed . . . quality built because quality pays you. Ask for bulletins . . . or for recommendations . . . no obligation, of course.



STRING



HORIZONTAL



SCRAPER

For a  
Bigger Yield

**FEinc**

**CUSTOM  
DESIGNED  
CONTINUOUS  
FILTRATION**

**STOCKDALE**  
ENGINEERING LIMITED

LONDON ROAD SOUTH • POYNTON • CHESHIRE

Tel: Poynton 2601

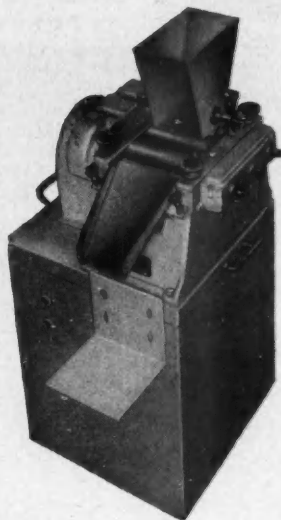
## for laboratory and small scale production

### TRIPLE ROLL MILLS

These are extremely useful mills for dispersion of material in media and used by leading manufacturers for laboratory purposes. Ideal for sampling, experimental work, production testing and small scale production.

There are three models available with roll diameters 2", 3½" and 6", and are supplied complete with motor. The rolls fitted can be either hard, acid resisting porcelain or hardened and ground steel. Steel roll models can be fitted with either solid rolls or hollow rolls for heating or cooling.

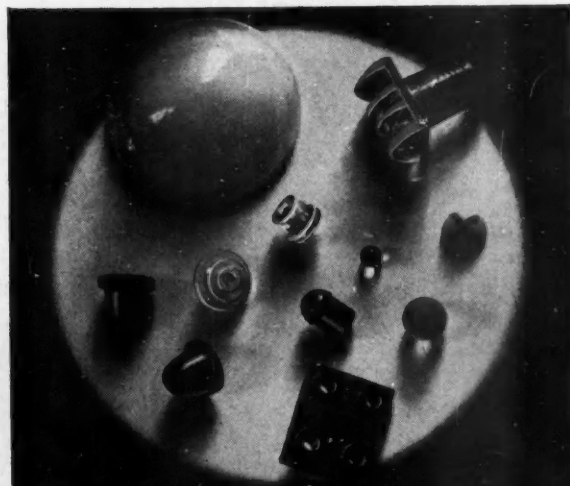
The No. 2 model illustrated is available with either a fixed centre roll or with a sliding centre roll. Roll settings in the latter model are adjusted by only two controls in place of the usual four.



# PASCALL

Write or phone  
Crawley 25166  
for List RM905

**THE PASCALL ENGINEERING CO. LTD.**  
GATWICK ROAD • CRAWLEY • SUSSEX



- BALLOTINI .06mm. TO 12mm. DIAMETER
- PRECISION GROUND GLASS BALLS
- SMALL GLASS MOULDINGS

**THE ENGLISH GLASS CO. LTD**

EMPIRE ROAD, LEICESTER

Specialists in  
small glass mouldings

**EGC**

Telephone:  
Leicester 23481-2

# VENTILATION AND FIRE PROTECTION!



## with the COLT DUAL PURPOSE FIRE VENTILATOR

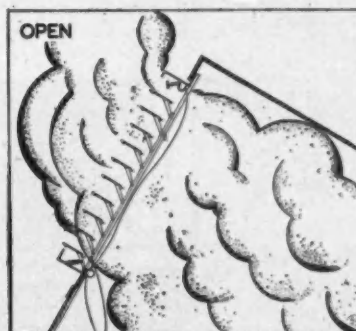
at AC-Delco, Division of General Motors Ltd., Southampton.

A study of industrial fires in Great Britain and in America has shown that the primary cause for the spread of fire is the super-heated air, smoke and explosive gases trapped under the roof. They build up in heat and intensity from the fire below and cause flash fires. Furthermore, the smoke rapidly extends downwards, entirely filling the premises and preventing the work of the fire fighters.

Colt have successfully solved this problem with the design of the Dual Purpose Fire Ventilator which provides ventilation during normal conditions and—in the event of fire—functions as a heat and smoke exhaust.

The installation of heat and smoke exhausts is standard practice in America and is rapidly being adopted by leading industrialists in the United Kingdom. Already, 1,290 Colt Dual Purpose Fire Ventilators have been installed in General Motors buildings in this country.

Write to Dept.A29/5 for paper "Some Aspects of Fire Prevention in Industrial Buildings" by M. J. Reaney, which deals fully with this matter.



The insets illustrate the action of the ventilator as a Heat and Smoke Exhaust. In the event of fire, the fusible link fuses, providing Automatic Escape for Super-Heated Air and Smoke.

# COLT

# VENTILATION



COLT VENTILATION LTD · SURBITON · SURREY

TELEPHONE: ELMBRIDGE 6511 (10 lines)

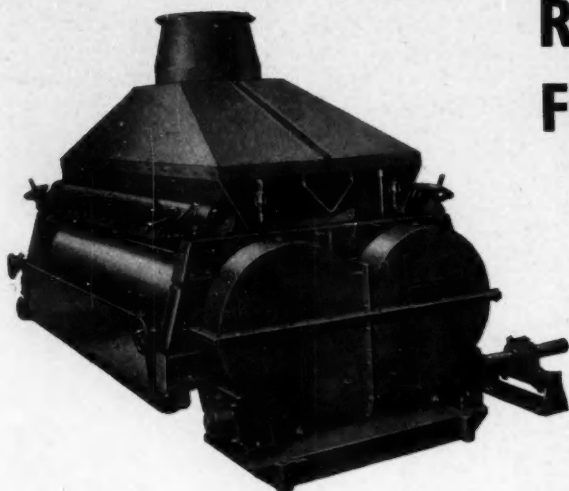
U.S.A. Subsidiary: Colt Ventilation of America Inc., Los Angeles.

Branches at: Birmingham, Bradford, Bridgend (Glam.), Bristol, Coventry, Dublin, Edinburgh, Glasgow, Liverpool, London, Manchester, Newcastle-upon-Tyne, Sheffield, and Warwick.

Agents in: Australia, Belgian Congo, Canada, Cyprus, India, Indonesia, Madagascar, Malaya, Mauritius, New Zealand, Pakistan, Portugal, North and South Rhodesia, and South Africa.



## MULTITUBULAR DRIERS ROLLER FILM DRIERS FLAKERS & COOLERS



We offer accumulated experience of 50 years' specialization.

OUR WORKS, the largest in the United Kingdom devoted especially to DRYING MACHINERY, are laid out and equipped with the latest plant for this particular purpose.

MANY STANDARD SIZES including LABORATORY MODELS.

We have test plants always available

## RICHARD SIMON & SONS LIMITED

PHENIX WORKS • BASFORD • NOTTINGHAM • Tel: NOTTINGHAM 75136/7/8 & 71453

**HW**

**MNPT**

*Colour Intermediates*

**C Acid**

**Hickson & Welch Ltd**  
Castleford, Yorkshire.



For some of the newer  
products in this Chemical Age  
consult the latest  
supplementary lists of

## LIGHT'S ORGANIC CHEMICALS

Write for your copy

### L. LIGHT & CO. LIMITED

POYLE

COLNBROOK

BUCKS

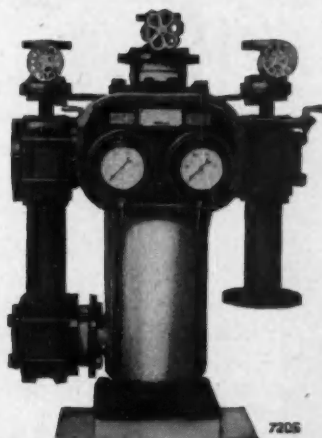


## SPECIAL STEAM EJECTOR AIR PUMP

Designed for the production and maintenance of Vacuum, and developed to meet the needs of a section of the Chemical Industry.

No metal parts in contact with corrosive gases.

Compression stages of carbon and condenser of porcelain.



7205

**The MIRRLEES WATSON**  
ENGINEERS COMPANY LIMITED  
GLASGOW, C.5

Telephone:  
South 2701-4

SCOTLAND STREET

London Office:  
38 Grosvenor Gardens, S.W.1  
Phone: Sloane 6221-2

# EVAPORATING PLANT

*Kestners have originated and developed many types of Evaporating Plant, amongst which are :*

Climbing and Falling Film; Multiple Effect; Salting; High Vacuum Multi-Circulation; Forced Circulations; Vapour Recompression; Acid Evaporators with no metallic contact and Keebon tubes for the heating surfaces; Evaporators heated by Infra-red ray and high temperature fluid heat transmission systems.

## THE KESTNER PATENT COOLCENTRATOR

An entirely new system for the continuous concentration or distillation of liquids at low temperatures without the use of steam.

*There is a Kestner Plant to suit all Evaporation problems. Concentration of Acid and Corrosive Liquors :*

Caustic Soda	Fruit Juices
Glue and Gelatine	Pharmaceuticals
Milk	Spinning Bath Liquors
Vegetable and Wood Extracts and chemical solutions generally.	

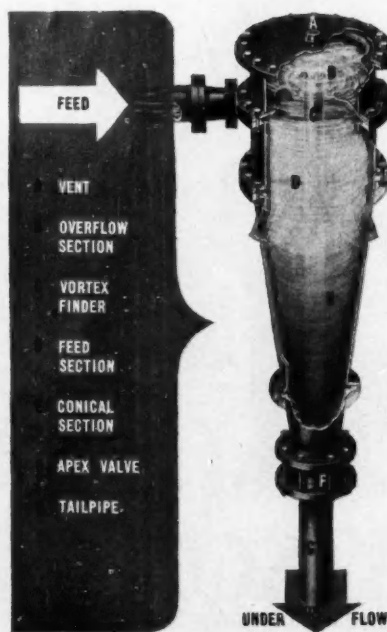


*Double Effect Climbing Film Evaporator for Corrosive Metallic Salt.*

**KESTNER EVAPORATOR & ENGINEERING CO. LTD. • 5 GROSVENOR GARDENS • LONDON S.W.1**

## THE DORRCLONE

(Dutch State Mines Cyclone)



The DorrClone is a compact cylindroconical classification unit utilising centrifugal force in place of gravity. It provides a modern method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current practices in the Classification of crystalline and other granular suspensions.

The new TM3 15 mm. diam. Rubber and 10 mm. diam. Bakelite multi-DorrClones are now firmly established in the Starch field and are finding use in the Classification of Whiting, Clay, Pigment and Pharmaceutical particles in the Submicron size range.

DorrClones are also available singly or in multiple arrangements in 3 in., 6 in., 12 in. and 24 in. diameters.



**DORR-OLIVER**  
COMPANY LIMITED

ABFORD HOUSE, WILTON ROAD, (VICTORIA), LONDON, S.W.1

## INTRODUCING

# VITREOUS ENAMELLED TRAYS

M O R E   D U R A B L E   L E S S   C O S T L Y

We are now pleased to offer Drying Trays, finished in Best Quality Acid Resisting Vitreous Enamel, in sizes 32" x 16" x 1½" deep, or 32" x 32" x 1½" deep, with rounded corners and sides, to facilitate emptying and cleaning, and we are confident that these Trays represent outstanding value. Not only are they more durable and more robust, but their cost offers considerable economy.

We invite your enquiries for these remarkable Trays, in either of these sizes, or to individual requirements.



**CONTROLLED CONVECTION DRYING CO LTD**  
 CLEVELAND BUILDINGS 94, MARKET STREET  
 Manchester, 1. Telephone: Deansgate 7391

**HAND IN GLOVE WITH**

*Safety*



MEMBERS OF THE ROYAL SOCIETY  
 FOR THE PREVENTION OF ACCIDENTS



The comprehensive range of "EVERTRUSTY" Industrial gloves ensures that whatever the job, whatever the conditions, the hand will indeed be safe! The full range includes an Industrial glove for every purpose.

*Above:* "EVERTRUSTY" 146 Wrist length chrome leather glove with seams inside.

*Top left:* "EVERTRUSTY" 326A Asbestos finger glove lined inside.

*Lower left:* "DOUBLE DIGIT" D.D.4. Reversible chrome leather glove, wrist length with seams inside.

**WALLACH**

*For over 70 Years*



*Specialists in Industrial Safety*

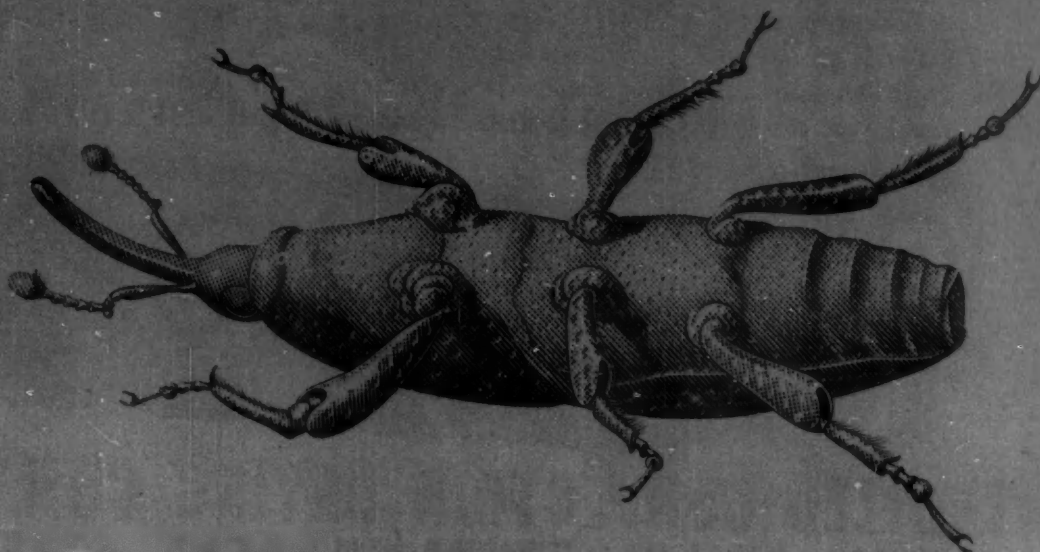
**BROS. LTD.**

MANUFACTURERS OF INDUSTRIAL GLOVES AND PROTECTIVE CLOTHING

49, TABERNACLE ST., LONDON, E.C.2. Telephone: CLerkenwell 1448/9. Grams: Hammerman, Ave., London.



## Deadly to insects



## Harmless to foodstuffs

### Pyrethrum-based insecticides

Pyrethrum P.Y.R. is harmless to animals and human beings. It can be used safely in close proximity to foodstuffs.

Pyrethrum P.Y.R. combines very high knock-down with effective killing power. And with suitable synergists these effects can be markedly enhanced. Insecticides based on African Pyrethrum are particularly effective in dealing with flying insects and with pests that attack stored products. They do a first-class job in public health work and in the protection of food supplies. Insects do not develop resistance to Pyrethrum P.Y.R. as they do to many other insecticides.

Detailed information about African Pyrethrum and advice on its use for domestic, industrial and other purposes are available on request.

**P.Y.R.**  
AFRICAN PYRETHRUM

MITCHELL COTTS & CO LTD

Winchester House, Old Broad Street, London, E.C.2  
Telephone: London Wall 6000

Overseas Agents to:

The Pyrethrum Board of Kenya, Nakuru, Kenya Colony  
The Pyrethrum Board of Tanganyika, Mbeya, Tanganyika Territory  
Société Co-opérative des Produits Agricoles, Goma, Belgian Congo



VOL. 77

No. 1974

11 MAY 1957

Telephone: FLEet Street 3212 (26 lines)

Telegrams: Allangas . Fleet . London

Editor

M. C. HYDE

Manager

H. A. WILLMOTT

Director

N. B. LIVINGSTONE WALLACE

BOUVERIE HOUSE • 154 FLEET STREET • LONDON • EC4

## GERMANY'S BIG THREE

### Midlands Office

Daimler House, Paradise Street,  
Birmingham. [Midland 0784-5]

### Leeds Office

Martins Bank Chambers, Park Row,  
Leeds 1. [Leeds 22601]

### Scottish Office

116 Hope Street, Glasgow, C2.  
[Central 3954-5]

## IN THIS ISSUE

Cadmium Poisoning Fatality	794
Euratom Report	794
Fison's New Research Station	795
Sales Record for Monsanto	796
SAI Expansion at Leith	797
Distillates	798
By-products from New Coking Plant	799
Sulphuric Acid Returns	800
Overseas News	801
New Granulating Plant	802
German Companies' Results	803
Chemist's Bookshelf	804
Progress at Grangemouth	807
Canadian Expansion Plans	808
People in the News	809
Commercial News	811
New Patents	812
For Your Diary	812
Trade Notes	812
Market Reports	813

Annual subscription is 52s 6d (\$7.40),  
single copies 1s 3d (by post 1s 6d).

THE THREE big West German chemical giants continued their phenomenal rate of expansion during 1956 (see page 803). Substantial increases in total sales and exports were recorded, but there is no doubt that these companies are feeling the same economic conditions that have been reducing profit margins in this country, as mentioned in our leading article last week.

Each of the three companies—Bayer, BASF and Hoechst—report keener competition and lower prices in foreign markets and the average proceeds both from home and abroad were lower last year as well. Volume of turnover expansion was, therefore, larger than the value figures, which compares with the results of the larger UK chemical concerns. Unlike these latter, however, the German companies have disclosed greatly increased net profits and dividend rates have been raised.

Capital expenditure on new plants increased last year, but it is expected that investment this year will be somewhat smaller. It should be noted that these major German chemical companies consider an increase in their share capital imperative, Farbenfabriken Bayer, who last year raised their capital, now asking shareholders' authorisation to increase capital still further to DM 750 million.

Due note should be taken of these companies' interests in Latin American markets. Bayer will have a chemical plant in production by next year in Brazil. In Argentina, the company has extended its azo-dyestuffs factory, a Brazilian company in which Bayer hold an interest is to start synthetic phenol production late this year and a wholly owned subsidiary will produce agricultural chemicals. In Chile, a pharmaceuticals processing and packaging plant has been set up. Nearer the US, Bayer are to set up plants in Mexico for the production of plant protection chemicals and textile printing inks, while in the US the company has increased its interests in certain fields. Farbwerke Hoechst are also setting up processing and packaging plants in Latin American markets and Mexico.

Germany chemical concerns have always had an interest in Latin America, and undoubtedly see a worthwhile future in developing overseas companies and subsidiaries. It is to be regretted that UK chemical concerns are not more active in participating in the development of the chemical industries of the South American countries.

These companies are basing their futures on the agricultural chemicals, plastics and raw materials for this industry and synthetic fibres, while investigations in the fields of radioactivity are not being neglected. That it is the new products which are responsible for the sales increases and profit rises is readily seen when it is noted that 40 per cent of Bayer sales last year were made up of products not available before 1948 and similarly with Hoechst, where 20 per cent of its turnover was obtained from products not in existence five years ago. German chemical concerns have, of course, had to seek new products and developments on which to base their futures in order to overcome the disadvantages occasioned by the acquisition of their successful patents by the UK, US etc. during the last war.

The German companies are aiming to expand capacities where required to maintain their supply position and fulfil demands. The rapid rate of expansion noted over the last seven years, however, is unlikely to continue as Germany has now entered a period of consolidation. Also the German manufacturers are now meeting price competition in export markets and are finding it increasingly difficult to pass on rising costs. High interest rates in the German capital market with comparatively low depreciation rates are proving a disadvantage. Even the high rate of capital investment only slightly improved productivity.

The projected common market for Europe has had as mixed a reception in Germany as in this country. Bayer, with 9 per cent of their sales in the common market countries see 'an essential stabilisation of business'; BASF are withholding judgment for the time being; Hoechst appear even more cautious.

## A FATALITY DUE TO CADMIUM

**P**OISONING due to cadmium was discussed in the ninth part of the 'Toxic Hazards in Industry' series (CHEMICAL AGE, 4 May, page 768). Few fatal cases of cadmium poisoning have been reported, although many non-fatal cases have been. The latest issue of *The Analyst* (April issue, page 287), however, contains a note from Leeds City Analyst's Department on a recent fatal case due to cadmium poisoning.

This case is of particular interest in that, although cadmium oxide was involved, the dust and fumes were produced from the decomposition of an organic compound of the metal.

One kilogram of cadmium propionate was being dried in two trays, one above the other, in 500 g. quantities, in an electrically heated oven at 100° C. During the luncheon interval, the temperature was reduced to 60° C as a precautionary measure. By some misadventure, the cadmium propionate became overheated and exploded, the fumes produced blowing open the oven door and causing the laboratory to be filled with reddish brown smoke, which was mistaken for a fire.

The fire brigade, which was summoned, entered the laboratory without respirators and subsequently suffered from sickness and headache. All but one recovered after treatment with oxygen and carbon dioxide. The laboratory technician, who entered the laboratory first, and switched off the oven current, was violently sick, but recovered.

The fireman who did not recover, was taken ill on the day following the incident with wheezing and coughing and died five and a half days after exposure.

The amounts of cadmium oxide found after death were small, as the victim had been eliminating the poison up to death. It was therefore impossible to estimate the amount of cadmium taken into the system. (The minimum lethal dose has been stated to be one gramme—Kaye, S., 'Handbook of Emergency Toxicology').

Tests indicated that the compound, when heated in a test-tube over a small bunsen flame, decomposes readily. However, when heated in a Durham tube surrounded by liquid paraffin in a Thiele melting-point apparatus at 240° C, only slight darkening of the compound occurred. At 290° C (sulphuric acid being substituted for liquid paraffin at 260° C) the compound became very dark. Heated for half an hour in a beaker at 100° C in an electric oven, no loss of weight occurred, a loss of 0.6 per cent only occurring at 180° C. At 200° C, there was a change, the compound becoming pale yellow in colour with a slight smell suggestive of formation of diethyl ketone, the normal result of dry distillation of the compound.

While the bunsen test might have some significance, the further tests carried out on cadmium propionate at higher temperatures in no instance produced the decomposition such as occurred in the original incident.

## CHILEAN NITRATE

**I**T seems that the Chilean nitrate industry which has recently been passing through difficult times can expect a return to prosperity in about two years. The Chilean nitrate referendum was ratified just in time to save the industry from complete collapse; one of the first benefits of the referendum has been the loan of US \$16 million to the Anglo-Lautaro Nitrate Corporation from the Export-Import Bank.

Difficult conditions are likely to continue for a while, but once the solar evaporation plant has been completed in about two years' time, Chilean nitrate should again be able to compete with the synthetic product, says the President.

It has been the experience of the industry that the old Shanks processing system could only commercially treat minerals with a 15 per cent content of nitrate and that the Guggenheim system, at present employed by the large Chilean companies, treats minerals with a 7 per cent nitrate content. The solar evaporation system is expected to make possible utilisation of minerals with as low a content as 5 per cent; thus the exploitable mineral reserves will be increased by about nine times.

The corporation's president also believes that the new system will open up possibilities for a vast chemical industry based on by-products. At present scientific research is being intensified with this in view.

## THE EURATOM REPORT

**T**HE eagerly-awaited report of Euratom's 'three wise men,' has now been published. It calls for an immediate start on a 10-year 15-million kilowatt programme of nuclear power station construction in the six Euratom countries; this compares with the British programme which would produce 6 million kilowatt of capacity by 1965.

Lack of technical know-how in Europe, can, the three-man commission believes, be overcome by the co-operation which the UK and US have offered. It will undoubtedly in the early stages require a considerable reliance on UK and US productivity capacity. First orders, according to the report, should be placed by the end of 1958, when results of experience will be available, not only from Calder Hall but also from Shippingport, the American experimental reactor.

It had been hoped that the report would indicate to what extent the UK or US might have been favoured in the initial planning, but this, it appears, is still an open question. Indeed, the 'wise men's' comment on the US reactor shows that they consider this type to be as promising as the Calder Hall type. Favourable comment is also made on a Canadian power reactor.

The US reactor requires specially enriched grades of fuel, unlike the UK Calder Hall type, and since Europe has no facilities for the expensive enrichment process, this had been thought to be a considerable point in favour of the UK. However, the US have offered firm supplies of enriched uranium at one-third of the expected cost. A further point is that plutonium, a by-product of the uranium process, will later become available as a result of normal operation and would then provide a workable substitute for enriched uranium.

Perhaps of most significance in the report is the feeling of encouragement which this commission has drawn from UK achievement in so short a space of time. It suggests that the commission believe that with technical knowledge available to the research workers and engineers of the Euratom countries, their developments will be no less quick than our own, particularly having regard to Euratom's incentives in cutting down fuel imports and avoiding such complete dependence on the Middle East.

# FISONS OPEN NEW RESEARCH STATION

## Latest Equipment for Levington Laboratories

**F**ISONS new research station at Levington, Suffolk, was officially opened on Tuesday, 7 May, by Professor Sir Alexander Todd, chairman of the Advisory Council on Scientific Policy.

Among the aspects of research that the distinguished company of visitors saw on opening day were work on the production of fertiliser compounds based on nitric acid and the use of radioactive isotopes.

The new laboratories, the most modern of their kind, are fitted with the latest equipment. Research workers in these model laboratories are given a wide freedom of action.

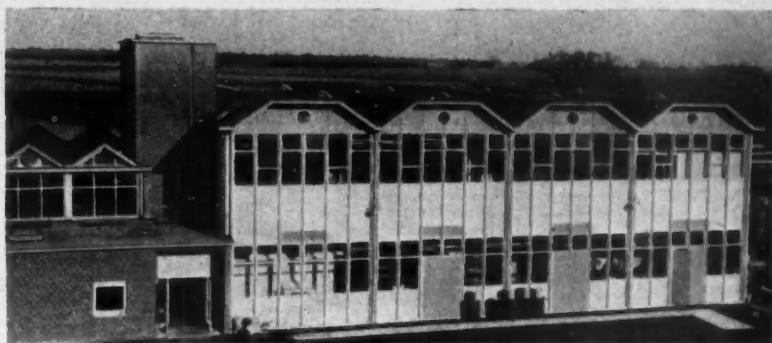
The guests, who travelled to Levington by special train from London, included G. Brearley, of the Association of British Chemical Manufacturers; Dr. Frank Cooper, research director (industrial) Cooper McDougall and Robertson Ltd.; Dr. G. A. Cowie, Potash Ltd.; Mr. Leo d'Erlanger, chairman, Erlangers Ltd.; Professor M. B. Donald, University College (chemical engineering); Mr. W. C. d'Leny, research director (industrial) ICI Ltd.; Dr. E. H. T. Hoblyn, director, British Chemical Plant Manufacturers' Association; Dr. P. Weiner, Mayor of Ipswich; Dr. J. Manning, (ICI), president of the Fertiliser Society; Professor J. W. Melstead, University of Illinois; Sir William Ogg, director, Rothamsted Experimental Station; Dr. D. D. Pratt, director of the DSIR chemical research laboratory; Dr. B. Raistrick, Scottish Agricultural Industries Ltd.; Mr. B. Topley, research director, Albright and Wilson Ltd.; Mr. A. S. White, head of chemical engineering division, UK Atomic Energy Authority; Professor W. Wardlaw, president, Royal Institute of Chemistry; Dr. A. H. Wilson, research director, Courtaulds Ltd.

### Vital Link

The station is the research centre of the fertiliser and heavy chemical division of Fisons Ltd. and links the central laboratories with associated farms and horticultural area at Levington and a grassland establishment at North Wyke, Devon.

Administrative staff at Levington provide the services, including accounting, library, instrument and engineering workshops, which are necessary in a scientific research group requiring associated endeavours ranging from economic appraisals to the design of novel apparatus.

The work of the station is divided between the department of soil science, which deals with soil and agronomic problems, seeking the greatest benefit from the combination of natural factors and the use of fertilisers, and the department of chemistry which investigates new



*Process laboratory at Levington in which new and improved methods of fertiliser manufacture are investigated on a small scale*

and improved processes for producing plant nutrients in forms that have suitable properties in manufacture, handling and use.

Main laboratories at the station have been built to provide versatility in the arrangement of space and services. The floors are carried from the vertical walls of the corridors running along the longitudinal axis of the block. The laboratory services, lighting, panel heating, extraction and ventilating systems are supplied between floors and ceilings within repetitive modules. The whole laboratory space is subdivided by removable partitions and fitted with standardised furnishing units than can readily be rearranged to follow changing patterns of research.

The present complement includes about 60 graduate and 80 non-graduate staff, with 70 wage earners. It is expected that the research groups will be expanded over the next two years, particularly at graduate level.

The department of chemistry will

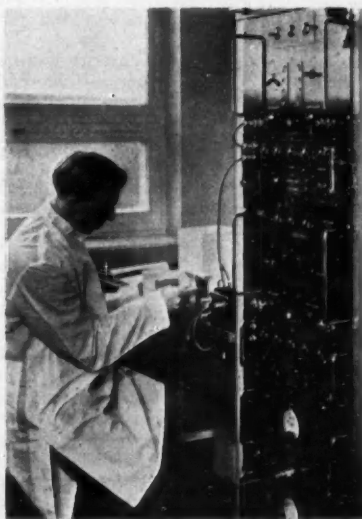
carry out all the chemical research for Fisons division 1—fertilisers and heavy chemicals. The fertilisers mainly comprise granular mixtures of nitrogen, phosphate and potash plant foods. The company's interests initially in heavy chemicals associated with fertiliser manufacture have now developed in wider fields. The department is organised as two research groups—fundamental and process.

**Fundamental Research Group.**—The analytical section is responsible for all chemical analytical work at the station, except soil and crop analyses. Fertilisers and pesticides incorporated with fertilisers provide the main problems in the work, which involves the development of new methods as well as the use of those now established. The analytical methods for complex solid materials in particular require considerable attention.

Staffed principally by specialists in physical and inorganic chemistry, the aim of the fundamental research sections is to improve present basic knowledge of manufacturing processes and to apply modern techniques for better assessment of the company's products. Subjects under investigation include the application of physical methods of examination of solids, equilibrium studies between mixtures of salts and water, the drying of solids, the preparation of small quantities of new fertilisers for agronomic testing and the kinetics of individual steps relating to manufacturing operations.

**Process Research Group.**—The laboratory section has a graduate staff of chemical engineers and chemists with experience in the manufacture of fertilisers and heavy chemicals. The laboratory work embraces all aspects of fertiliser manufacture and includes techniques which are correlated with large-scale manufacturing procedure. The section is developing test methods for controlling standards of product quality. It also deals with the production of special fertilisers in experimental quantities.

The process laboratories, operated by a small team of chemical engineers, house small-scale pilot plant which is used both for the chemical engineering assessment of new processes and for production of small batches of experimental fertilisers.



*Radioactive isotopes are the main tools in soil chemistry research in which the primary theme is phosphorus in relation to soil and crops*



The German companies are aiming to expand capacities where required to maintain their supply position and fulfil demands. The rapid rate of expansion noted over the last seven years, however, is unlikely to continue as Germany has now entered a period of consolidation. Also the German manufacturers are now meeting price competition in export markets and are finding it increasingly difficult to pass on rising costs. High interest rates in the German capital market with comparatively low depreciation rates are proving a disadvantage. Even the high rate of capital investment only slightly improved productivity.

The projected common market for Europe has had as mixed a reception in Germany as in this country. Bayer, with 9 per cent of their sales in the common market countries see 'an essential stabilisation of business'; BASF are withholding judgment for the time being; Hoechst appear even more cautious.

## A FATALITY DUE TO CADMIUM

**P**OISONING due to cadmium was discussed in the ninth part of the 'Toxic Hazards in Industry' series (CHEMICAL AGE, 4 May, page 768). Few fatal cases of cadmium poisoning have been reported, although many non-fatal cases have been. The latest issue of *The Analyst* (April issue, page 287), however, contains a note from Leeds City Analyst's Department on a recent fatal case due to cadmium poisoning.

This case is of particular interest in that, although cadmium oxide was involved, the dust and fumes were produced from the decomposition of an organic compound of the metal.

One kilogram of cadmium propionate was being dried in two trays, one above the other, in 500 g. quantities, in an electrically heated oven at 100° C. During the luncheon interval, the temperature was reduced to 60° C as a precautionary measure. By some misadventure, the cadmium propionate became overheated and exploded, the fumes produced blowing open the oven door and causing the laboratory to be filled with reddish brown smoke, which was mistaken for a fire.

The fire brigade, which was summoned, entered the laboratory without respirators and subsequently suffered from sickness and headache. All but one recovered after treatment with oxygen and carbon dioxide. The laboratory technician, who entered the laboratory first, and switched off the oven current, was violently sick, but recovered.

The fireman who did not recover, was taken ill on the day following the incident with wheezing and coughing and died five and a half days after exposure.

The amounts of cadmium oxide found after death were small, as the victim had been eliminating the poison up to death. It was therefore impossible to estimate the amount of cadmium taken into the system. (The minimum lethal dose has been stated to be one gramme—Kaye, S., 'Handbook of Emergency Toxicology').

Tests indicated that the compound, when heated in a test-tube over a small bunsen flame, decomposes readily. However, when heated in a Durham tube surrounded by liquid paraffin in a Thiele melting-point apparatus at 240° C, only slight darkening of the compound occurred. At 290° C (sulphuric acid being substituted for liquid paraffin at 260° C) the compound became very dark. Heated for half an hour in a beaker at 100° C in an electric oven, no loss of weight occurred, a loss of 0.6 per cent only occurring at 180° C. At 200° C, there was a change, the compound becoming pale yellow in colour with a slight smell suggestive of formation of diethyl ketone, the normal result of dry distillation of the compound.

While the bunsen test might have some significance, the further tests carried out on cadmium propionate at higher temperatures in no instance produced the decomposition such as occurred in the original incident.

## CHILEAN NITRATE

**I**T seems that the Chilean nitrate industry which has recently been passing through difficult times can expect a return to prosperity in about two years. The Chilean nitrate referendum was ratified just in time to save the industry from complete collapse; one of the first benefits of the referendum has been the loan of US \$16 million to the Anglo-Lautaro Nitrate Corporation from the Export-Import Bank.

Difficult conditions are likely to continue for a while, but once the solar evaporation plant has been completed in about two years' time, Chilean nitrate should again be able to compete with the synthetic product, says the President.

It has been the experience of the industry that the old Shanks processing system could only commercially treat minerals with a 15 per cent content of nitrate and that the Guggenheim system, at present employed by the large Chilean companies, treats minerals with a 7 per cent nitrate content. The solar evaporation system is expected to make possible utilisation of minerals with as low a content as 5 per cent; thus the exploitable mineral reserves will be increased by about nine times.

The corporation's president also believes that the new system will open up possibilities for a vast chemical industry based on by-products. At present scientific research is being intensified with this in view.

## THE EURATOM REPORT

**T**HE eagerly-awaited report of Euratom's 'three wise men,' has now been published. It calls for an immediate start on a 10-year 15-million kilowatt programme of nuclear power station construction in the six Euratom countries; this compares with the British programme which would produce 6 million kilowatt of capacity by 1965.

Lack of technical know-how in Europe, can, the three-man commission believes, be overcome by the co-operation which the UK and US have offered. It will undoubtedly in the early stages require a considerable reliance on UK and US productivity capacity. First orders, according to the report, should be placed by the end of 1958, when results of experience will be available, not only from Calder Hall but also from Shippingport, the American experimental reactor.

It had been hoped that the report would indicate to what extent the UK or US might have been favoured in the initial planning, but this, it appears, is still an open question. Indeed, the 'wise men's' comment on the US reactor shows that they consider this type to be as promising as the Calder Hall type. Favourable comment is also made on a Canadian power reactor.

The US reactor requires specially enriched grades of fuel, unlike the UK Calder Hall type, and since Europe has no facilities for the expensive enrichment process, this had been thought to be a considerable point in favour of the UK. However, the US have offered firm supplies of enriched uranium at one-third of the expected cost. A further point is that plutonium, a by-product of the uranium process, will later become available as a result of normal operation and would then provide a workable substitute for enriched uranium.

Perhaps of most significance in the report is the feeling of encouragement which this commission has drawn from UK achievement in so short a space of time. It suggests that the commission believe that with technical knowledge available to the research workers and engineers of the Euratom countries, their developments will be no less quick than our own, particularly having regard to Euratom's incentives in cutting down fuel imports and avoiding such complete dependence on the Middle East.



# FISONS OPEN NEW RESEARCH STATION

## Latest Equipment for Levington Laboratories

**F**ISONS new research station at Levington, Suffolk, was officially opened on Tuesday, 7 May, by Professor Sir Alexander Todd, chairman of the Advisory Council on Scientific Policy.

Among the aspects of research that the distinguished company of visitors saw on opening day were work on the production of fertiliser compounds based on nitric acid and the use of radioactive isotopes.

The new laboratories, the most modern of their kind, are fitted with the latest equipment. Research workers in these model laboratories are given a wide freedom of action.

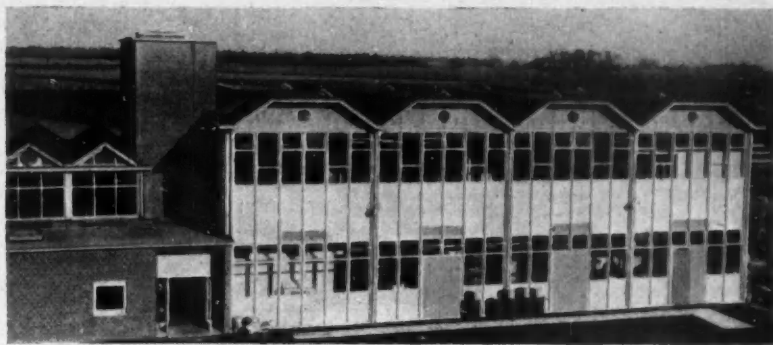
The guests, who travelled to Levington by special train from London, included G. Brearley, of the Association of British Chemical Manufacturers; Dr. Frank Cooper, research director (industrial) Cooper McDougall and Robertson Ltd.; Dr. G. A. Cowie, Potash Ltd.; Mr. Leo d'Erlanger, chairman, Erlangers Ltd.; Professor M. B. Donald, University College (chemical engineering); Mr. W. C. d'Leny, research director (industrial) ICI Ltd.; Dr. E. H. T. Hoblyn, director, British Chemical Plant Manufacturers' Association; Dr. P. Weiner, Mayor of Ipswich; Dr. J. Manning, (ICI), president of the Fertiliser Society; Professor J. W. Melstead, University of Illinois; Sir William Ogg, director, Rothamsted Experimental Station; Dr. D. D. Pratt, director of the DSIR chemical research laboratory; Dr. B. Raistrick, Scottish Agricultural Industries Ltd.; Mr. B. Topley, research director, Albright and Wilson Ltd.; Mr. A. S. White, head of chemical engineering division, UK Atomic Energy Authority; Professor W. Wardlaw, president, Royal Institute of Chemistry; Dr. A. H. Wilson, research director, Courtaulds Ltd.

### Vital Link

The station is the research centre of the fertiliser and heavy chemical division of Fisons Ltd. and links the central laboratories with associated farms and horticultural area at Levington and a grassland establishment at North Wyke, Devon.

Administrative staff at Levington provide the services, including accounting, library, instrument and engineering workshops, which are necessary in a scientific research group requiring associated endeavours ranging from economic appraisals to the design of novel apparatus.

The work of the station is divided between the department of soil science, which deals with soil and agronomic problems, seeking the greatest benefit from the combination of natural factors and the use of fertilisers, and the department of chemistry which investigates new



*Process laboratory at Levington in which new and improved methods of fertiliser manufacture are investigated on a small scale*

and improved processes for producing plant nutrients in forms that have suitable properties in manufacture, handling and use.

Main laboratories at the station have been built to provide versatility in the arrangement of space and services. The floors are carried from the vertical walls of the corridors running along the longitudinal axis of the block. The laboratory services, lighting, panel heating, extraction and ventilating systems are supplied between floors and ceilings within repetitive modules. The whole laboratory space is subdivided by removable partitions and fitted with standardised furnishing units than can readily be rearranged to follow changing patterns of research.

The present complement includes about 60 graduate and 80 non-graduate staff, with 70 wage earners. It is expected that the research groups will be expanded over the next two years, particularly at graduate level.

The department of chemistry will

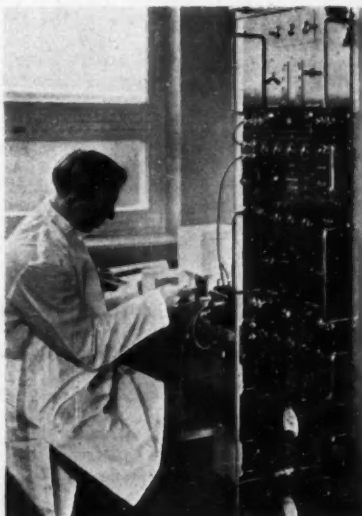
carry out all the chemical research for Fisons division 1—fertilisers and heavy chemicals. The fertilisers mainly comprise granular mixtures of nitrogen, phosphate and potash plant foods. The company's interests initially in heavy chemicals associated with fertiliser manufacture have now developed in wider fields. The department is organised as two research groups—fundamental and process.

**Fundamental Research Group.**—The analytical section is responsible for all chemical analytical work at the station, except soil and crop analyses. Fertilisers and pesticides incorporated with fertilisers provide the main problems in the work, which involves the development of new methods as well as the use of those now established. The analytical methods for complex solid materials in particular require considerable attention.

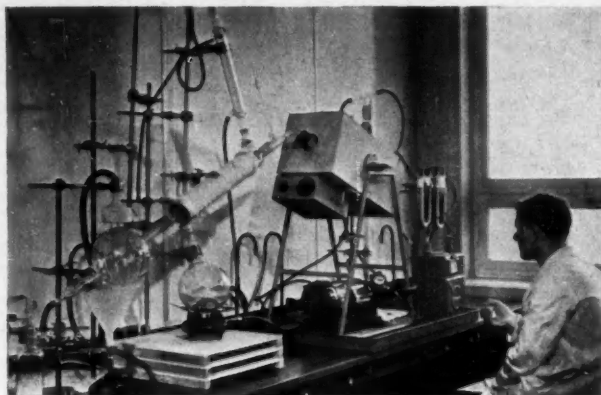
Staffed principally by specialists in physical and inorganic chemistry, the aim of the fundamental research sections is to improve present basic knowledge of manufacturing processes and to apply modern techniques for better assessment of the company's products. Subjects under investigation include the application of physical methods of examination of solids, equilibrium studies between mixtures of salts and water, the drying of solids, the preparation of small quantities of new fertilisers for agronomic testing and the kinetics of individual steps relating to manufacturing operations.

**Process Research Group.**—The laboratory section has a graduate staff of chemical engineers and chemists with experience in the manufacture of fertilisers and heavy chemicals. The laboratory work embraces all aspects of fertiliser manufacture and includes techniques which are correlated with large-scale manufacturing procedure. The section is developing test methods for controlling standards of product quality. It also deals with the production of special fertilisers in experimental quantities.

The process laboratories, operated by a small team of chemical engineers, house small-scale pilot plant which is used both for the chemical engineering assessment of new processes and for production of small batches of experimental fertilisers.



*Radioactive isotopes are the main tools in soil chemistry research in which the primary theme is phosphorus in relation to soil and crops*



*Laboratory investigation of the possible emission of fume and gas which can occur in granulating plants in which material is heated above the normal discharge temperature. Emission is assessed by absorption in suitable reagents and is related to the temperature in the heated granules*

In the radioactive isotope experiment concerning inorganic phosphorus determination in soils, soil is equilibrated at controlled temperature with an acid solution of radioactive phosphate ( $pH < 2$ ). After centrifuging in an MSE laboratory model, the total phosphate in the supernatant liquor is estimated colorimetrically by the 'molybdenum blue' technique and the radioactive phosphate is determined in the liquid counter. The Townson and Mercer water bath maintains a stable temperature at  $25^{\circ}\text{C}$ . The process enables precise phosphorus determination to be made.

The programme of the department of soil science is designed to advocate knowledge of soil and agronomic problems. The Levington agriculture section consists of two farms occupying more than 300 acres. The horticulture section comprises nine glasshouses. There are also field experiment and statistics sections.

The analytical section handles routine analyses of 35,000 field and pot trials a year; mechanisation and automation will bring this up to 60,000 during the next year, of which 50,000 will form part of the advisory service to farmers, the remainder being derived from research investigations.

The soil chemistry section is concerned with interactions between soils and fertilisers. The soil-plant phosphorus relationship is the main interest and the radioactive-tracer technique, a new approach to the problem, will be extensively used, particularly in determining the 'L' value of soils. The section also studies other nutrients and their chemical reactions in soil, e.g., the loss of nitrogen by volatilisation from ammonium salts added to calcareous soils.

In the chemistry department current work includes the preparation of nitrophosphate fertilisers. Nitric acid and Morocco rock replace sulphuric acid. The process involves the use of anhydrous ammonia and muriate of potash, and can be carried out on one plant. In this department visitors on Tuesday were shown work that has been patented on the heat treatment of gypsum and Senegal phosphate rock, which produces a basic slag type fertiliser, after recovery of  $\text{SO}_2$ . This process would only be put into operation in the event of an acute shortage of sulphur.

Work in the biochemistry section is centred on an investigation into the nature of phosphorus compounds in seeds

and seedlings and on the distribution in the plant of phosphorus from seed, soil and fertilisers. Paper and column chromatography and radioactive-tracer techniques are the main analytical methods used.

Biology and plant physiology sections are to be developed this year for investigations associated with other basic research studies.

Field and pot experiments, carried out on an extensive basis, link laboratory

investigations with farm and horticultural practice. This season more than 13,000 plots in agricultural and horticultural experiments are being laid down.

Head of the Levington research station staff is Dr. J. A. Storrow, Ph.D., D.Sc. (Manch.), M.I.Chem.E., Deputy director is Dr. J. G. Hunter, Ph.D. (Glasgow), F.R.I.C. Other members of the staff include: CHEMISTRY DEPARTMENT, head of department Dr. T. K. Hanson; chief chemist (co-ordination), Mr. T. P. Dee; fundamental group, chief chemist, Dr. J. R. Arthur; senior chemist, analytical section, W. C. Hanson, senior chemists, fundamental research sections, Dr. K. S. Barclay and Dr. A. L. Whyne; process research group, senior chemical engineer, W. F. Sheldrick. Chief chemical engineer has yet to be appointed.

DEPARTMENT OF SOIL SCIENCE, head of department, Dr. J. G. Hunter, Ph.D. (Glasgow), F.R.I.C.; chief grassland research officer, Dr. F. E. Moon; senior soil analyst, analytical section, J. Hislop; chief soil chemist, soil chemistry section, S. Larsen; senior biochemist, Dr. F. E. G. Harrop; senior biologist, Dr. R. C. Stephen.

Mr. D. W. Duke-Williams is administrative officer, and Mr. C. Hancock is accountant-secretary.

## Record Year for Monsanto with Sales Up by Four Per Cent

SALES of £14,035,000, a record, were reported by Monsanto Chemicals Ltd. during the year ended 31 December 1956. This is a four per cent increase over the figure for 1955. Profits, after providing for taxation, depreciation, directors' remuneration and audit fee, came to £843,254.

Capital expenditure during the year amounted to £2,240,822. A second interim dividend of 15 5/6 per cent less tax was paid on 3 April. As no further distribution will be made for 1956 this makes the total dividend for the year 22 1/2 per cent.

A further increase in export trade is reported by Sir Miles Thomas, chairman, in his statement. Business in overseas markets now accounts for 41 per cent of the total compared with 37 per cent in 1955.

Sir Miles claims that the new maleic anhydride plant now in operation at Newport will enable Monsanto to meet all known needs of British industry for this product. Cyclohexylamine, which will be used in the production of Monsanto rubber chemicals, will also be available for sale.

What Sir Miles describes as a 'major expansion of phthalic anhydride' has made progress at Newport and is scheduled to come into operation towards the end of the year. Plant for the manufacture of styrene-butadiene copolymers and melamine resins are also scheduled to begin production at Newport this year.

Sir Miles mentioned briefly the plans for the manufacture of chemicals from petroleum at the Esso refinery, Fawley. Construction work is planned to begin

almost immediately and the first plant, for the manufacture of polythene, should be completed by mid-1959. It will be followed by plant to produce acrylonitrile.

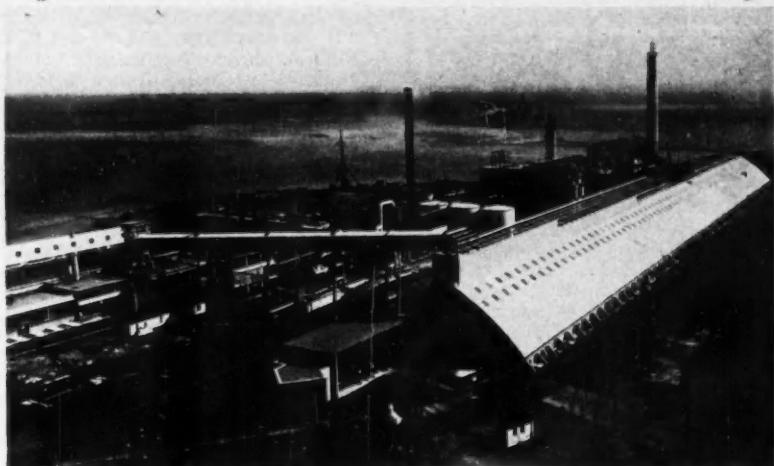
## BCPMA Criticises Steel Supply Position

AN INCREASE of four was recorded in the membership of the British Chemical Plant Manufacturers' Association during the year ended 31 December, says the annual report, just published. There are now 219 members.

Plans to help members with their research problems were discussed at a dinner held on 8 May last year. As a result a study was made of chemical engineering research at the universities. Visits made by members of the research committee showed that far more chemical engineering research was being carried out in the universities than had been realised. Other universities still have to be visited as well as DSIR and other research organisations.

An information exchange service was also set up to cover the exchange of non-confidential chemical engineering information.

Steel shortages are referred to in the report. The chemical plant industry experienced shortages throughout the year, particularly of mild and alloy steel plates and sections, and of alloy steel tubes. Lack of flexibility in steel production and distribution is largely blamed for these shortages. As a result many BCPMA members had difficulty in quoting firm delivery dates and in keeping delivery promises.

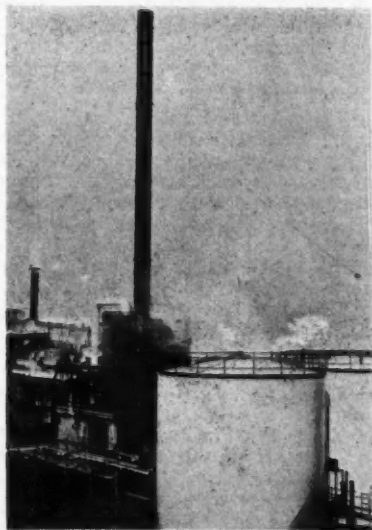


General view of the new fertiliser works of SAI, now being built at Leith, showing the 900 ft. long main storage building on the top of which is the partially constructed conveyor housing

## Progress Report from SAI Leith Fertiliser Factory

DESCRIBED as the biggest project in the history of Scottish Agricultural Industries, the new works at Leith, near Edinburgh, will be in operation by the autumn. To cost over £3 million and employing about 220 people, it will produce a range of concentrated fertilisers based on ammonium phosphate. The products of the new plant will be absorbed almost entirely by the Scottish market.

The sulphuric acid plant—of the sulphur burning contact type—is stated to be the largest of its kind in Scotland and began production in July 1956. It can produce 175 tons of acid a day. At present output is going to other SAI fertiliser plants by road and rail tankers.



Sulphur-burning contact sulphuric acid plant, claimed to be the largest of its kind in Scotland

The maintenance block which houses the workshops and general stores is already in use.

A conveyor gantry leading from Imperial dock to the storage building is now being sheeted and the 36 in. conveyor will be operating by June. It will carry raw materials at the rate of 350 tons an hour. The store is 900 ft. long

The sulphur section of the main storage building. Raw materials are discharged through ports in the roof



## Cement Additives and Germanium

A LIGHT WEIGHT aggregate for concrete, Terlite, is to be produced by the Cementation Company in a plant at Battersea, London. The plant was officially opened by the Minister of Power on 1 May.

The plant, built by Sinterlite Ltd., employs the Somogip process whereby fly ash from the power station is first turned into small pellets, and then heated in a furnace at a temperature of up to 2,000°F. Carbon contained in the fly ash is burned to heat the furnace.

The process could be applied to colliery slag and even low grade coal seams. Some 40 million tons of colliery

and can hold 56,000 tons of raw materials.

External work on the phosphoric acid plant is practically finished and installation of equipment here and in the granulation plant is up to schedule.

The 200 ft. high chimney has been finished externally. It will discharge effluent gases from the granulation plant, eliminating any nuisance from air pollution.

A 40,000 ton bulk store is to be erected on the site of the old fertiliser plant at Salamander Street. Ground has already been cleared. The finished product will be carried from the works to the store in special hopper-bottomed railway wagons. There will also be a high speed bagging plant at Salamander Street.

Three electric power stations on the site will provide a total capacity of 4,500 kilowatts.

The range of products to be manufactured will be announced at the Royal Highland Show to be held on 17 June.

## ICI Introduce New Lead Chrome Pigment

INTRODUCTION of pure primrose chrome L6GS powder, the third in a range of light-fast chrome pigments, is announced by the dyestuffs division of Imperial Chemical Industries.

Like its predecessors, pure lemon chrome L3GS powder and pure middle chrome LGS powder, the new pigment is a pure lead chrome which is claimed to have good purity of shade and resistance to darkening on exposure in typical paint media.

refuse is dumped each year and about 2,500 million tons has accumulated from the past. Much of this, claims Dr. Somogip, inventor of the process and head of Sinterlite Ltd., could be processed economically to produce heat and aggregate for use in cement.

Investigations are also being undertaken by CEA into the possibility of recovering germanium and other elements from power station refuse. Sinterlite Research Ltd., has shown that iron can be recovered economically by magnetic separation from fly ash having a sufficiently high iron content.





★ ASSURANCES that polythene contained no plasticisers which might have undesirable effects were given by Mr. N. J. Travis, managing director, British Visqueen, at Liverpool recently. Speaking to members of the Merseyside branch, Institute of Packaging, he said that when polythene was first discovered in the 1930s, a plasticiser was necessary as there were no extrusion machines available at the time operating at above the temperature of steam.

Saying that this was important information for the pharmaceutical industry, Mr. C. F. Ross of Evans Medical Supplies went on to say that he had noticed that polythene sometimes absorbed colour. Mr. Travis refused to be drawn. He said that without specific details of a case he could not give an explanation. Certain organic compounds were absorbed by polythene and if one of these happened to be coloured the colour would stay in the polythene. But, he went on, this did not detract from the fact that polythene was inert in acids and alkalis and generally speaking could be used with impunity.

★ ROYAL VISITOR to the Aylesford site of the Reed Paper Group last week was Prince Philip, who arrived by helicopter. He first saw two of the hydropulpers, each of which, working 24 hours a day, breaks up about three tons of pulp every 45 minutes into a mixture of wood fibre, chemicals and water. He saw other machines making kraft paper and sulphites.

After touring the Kimberly-Clark mill and factory, which have been making cellulose wadding products since 1952, the Prince saw the Medway paper sack factory that produces about 3 million multi-wall sacks a week. He was accompanied by Lord Cornwallis, Lord Lieutenant of Kent and chairman of Albert E. Reed and Co. Ltd., the parent company, and Mr. Philip G. Walker, managing director.

★ IN THE PAST few years a number of US chemical giants have opened branch factories or subsidiary companies in this country. Although the UK Government frowns on the transfer of profits earned in this country by such companies, the process is likely to be accelerated as the European common market project draws closer to reality. The greatest incentive for this trend comes not so much from the rewards to be gained from participation in a great new free trade area, but from a fear of being cut off from Europe by the tariff wall that is to be erected to the outside world.

On his return from a visit to the US, Mr. G. S. F. Ritson, director of the Lancashire and Merseyside Industrial Development Association, says that a number

of American chemical firms have promised to consider the setting up of branch factories in north-west England. He adds that US interest in overseas investments has been quickened by European free trade plans. US chemical firms are, of course, also interested in establishing branches in other European countries, notably Holland, where taxation is not so rigorous and which more freely allows profits earned in Europe to be transmitted to the US.

★ FISONS new research station at Levington, Suffolk, has a long connection with fertilisers, for it was through a chance discovery here more than 200 years ago that East Anglia had its first introduction to the benefits of fertilising the soil. John Kirby of Wickham Market in *The Suffolk Traveller*, 1764, said:

'In a farmer's yard in Levington . . . was dug the first Crag of Shell that has been found so useful for improving of land in this (Colneis) and other Hundreds in the neighbourhood. For though it appears from Books of Agriculture that the like Manure has long since been used in the West of England, it was not used here till this discovery was made casually by one Edmund Edwards, about the Year 1718. This man, being covering a field with Muck out of his Yard, and wanting a Load or two to finish it, carried some of the Soil that laid near the Muck, tho' it look'd to him to be no better than Sand; but observing the Crop to be best where he laid that, he was from thence encouraged to carry more of it the next Year; and the Success he had, encouraged others to do the like.'

It is appropriate that such modern fertiliser laboratories, a model of their kind, should be established at Levington where the beneficial properties of phosphates were first discovered in the eastern counties. Having toured these fine laboratories, Alembic estimates that the equipment alone must have cost more than £500,000.

★ EMPLOYEES of ICI who already have social clubs organised on a national scale for activities ranging from chess to football and amateur acting, may soon have another—a dog club. The idea comes from Dr. S. Tuchner of the pharmaceuticals division at Wilmslow, Cheshire. A breeder of a rare type of Italian whippet, he was struck by the number of dog entries at a recent ICI gala.

Dr. Tuchner now proposes to set up a national club for all ICI employees owning pedigree dogs.

★ IT IS PERHAPS difficult to understand in this age of science why so many firms do not support their own

research organisations. The situation was underlined last week by Dr. F. H. Banfield, director of research of the British Food Manufacturing Industries Research Association.

He disclosed that a survey based on Board of Trade statistics for 1955 has revealed that there were about 1,700 firms who appeared unaware of the value of research. Each employed up to about 30 operatives and obviously could not afford their own research department. He pointed out, however, that their laboratories could in fact become the laboratories of such firms for the cost of a packet of cigarettes a day.

To help such firms, the association has set up a liaison and advisory unit which on request will visit factories free of charge and investigate one manufacturing problem as a sample of the service they can give. The BFMIRA, representing 500 food firms, has its laboratories at Randalls Road, Leatherhead, where Dr. Banfield heads a team of 30 scientists.

★ AN interesting feature of some of the laboratories at the Royal Radar Establishment, recently visited by the Queen, is the special ceramic floor-tiling produced by the Royal Doulton potteries at Tamworth in a tough abrasion and corrosion-resisting porcelain body known as 'K5'.

The floor was laid by Prodorite in their Asplit 'A' cement, and the pink colour of this combines with the basket-weave pattern of the tiles to give an attractive effect. These tiles have a wide field of application for there are several branches of chemical, pharmaceutical and general technical research in which dust-free atmosphere is essential and where the use of ordinary tiles might give rise to dust hazards.

★ THE 58 year-old St. Cyprian's Church, Cathays, Cardiff, has been sold at an undisclosed figure, to Kenrick and Son Ltd., chemical and laboratory suppliers, Moira Terrace, Adamsdown. The last service was held in the Church in September, when more than 150 attended. The firm is converting the Church into warehouse premises.

★ Because of difficulties with emission of black iron oxide dust the Union Oxide and Chemical Company of Ripon, Yorkshire, has voluntarily stopped production. 'We are waiting for delivery of a more efficient filtration system' said Mr. Harwood, manager, 'this will take up to five or six weeks.'

There seems to be no guarantee that the new equipment will work although the supplying company has been given samples of the offending dust.

Many other companies which find or will find themselves in a similar predicament as a result of the clean air laws will await with interest the results of the work being carried out by Union Oxide.

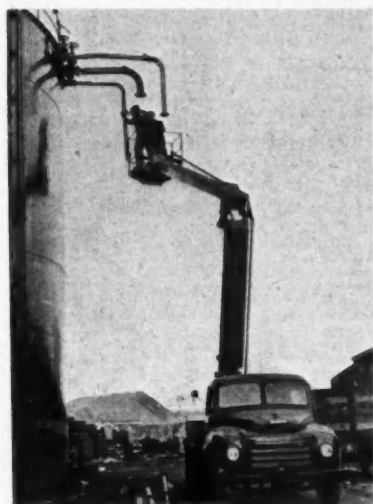
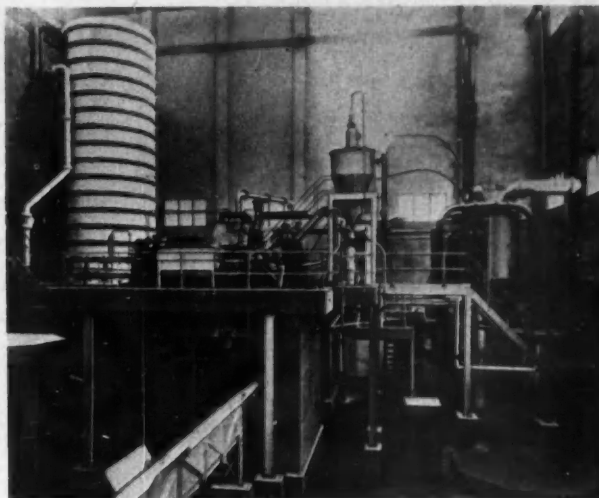
*Alembic*

## BY-PRODUCTS FROM BRITAIN'S LARGEST-EVER COKING PLANT

**L**ARGEST ever single unit coking plant to be built in Britain is the new coking plant at South Bank, Middlesbrough, built by Simon-Carves Ltd., to provide metallurgical coke for the new Clay Lane blast furnaces of Dorman Long (Steel) Ltd. The unit comprises 150 ovens with a weekly throughput of 25,000 tons of coal as charged, together with complete coal and coke handling equipment and by-product plant. The entire installation is arranged so that it can be duplicated.

The by-product plant is of orthodox design and embodies the indirect ammonia recovery system. The plant handles the gas from the whole of the coal throughput. Two foul gas mains, one

*Sulphate house  
with still on left*



*Simon hydraulic platform in use for  
overhead pipe fitting*

from each battery of 75 ovens, take the gas to primary condensers, each main having its own mechanical tar catch tank where primary tar and liquor separation takes place and from which the circulating liquor supply is drawn. These gas mains unite in a common inlet to nine primary condensers (one spare) of the vertical water-tube counter-current type, which cool the gas to 25 to 30°C at the exhauster inlets.

Two Richardsons Westgarth/Brown-Boveri exhausters have been installed one of which is spare. These have a designed pressure differential of 100 W.G. and superheat the gas 5 to 10°C. They are driven by steam turbines which are back-pressure machines and from which most of the process steam for the by-product plant is derived. A reducing valve on the high-pressure line serves to make up any deficiency. Dry saturated steam at 150 p.s.i.g. is received from the existing steam-raising plant. The steam supply

to the exhauster turbines is superheated by a coke oven gas-fired superheater in order to minimise turbine blade erosion and provide some control over the back-pressure steam temperature.

From the primary condensers, the gas passes to five secondary condensers (one spare) and thence through electro-detarers to a three-stage naphthalene scrubber tower. Naphthalene is stripped from the wash oil and returned to the tar while the oil is cooled and pumped back to the scrubber.

The gas passes from the scrubber tower to two-stage ammonia scrubber towers with counter-current circulation of cooled liquor from the sulphate plant. Strong liquor from the first stage is pumped to the stills in the sulphate plant. Free ammonia only is recovered, and full use is made of heat exchange between incoming liquor and outgoing still effluent. A Royston saturator has been installed with provision for two more.

Sulphate salt from two horizontal Watson Laidlaw centrifuges is dried in a Dunford and Elliott dryer and stored in bulk. The sulphate is removed when required by bracket-equipped fork-lift feeding a bagging-off bunker.

Benzole is recovered by three tower scrubbers in series from creosote oil which is stripped in the crude benzole still. Last traces of naphthalene in the

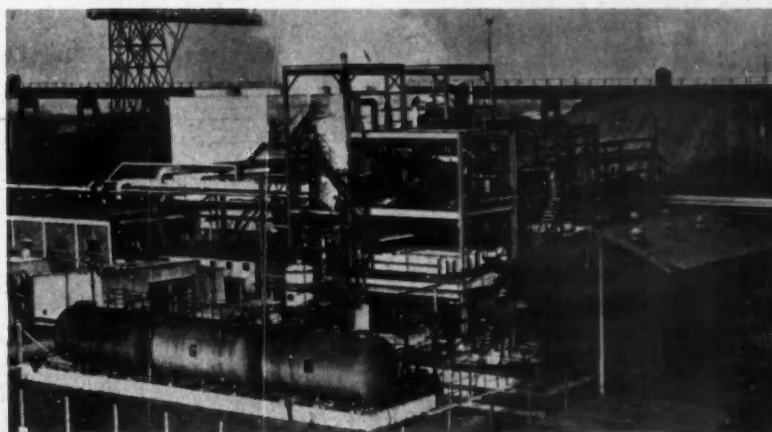
gas are washed out in three static washers in parallel.

Part of the gas from the final naphthalene scrubbers is returned to heat the ovens, part is boosted by Holmes-Connersville boosters into a main to the Warrenby steel plant, and the rest goes to the Cleveland steelworks low-pressure main. Acting as a balance holder is a three million cu. ft. Klönne dry gas-holder.

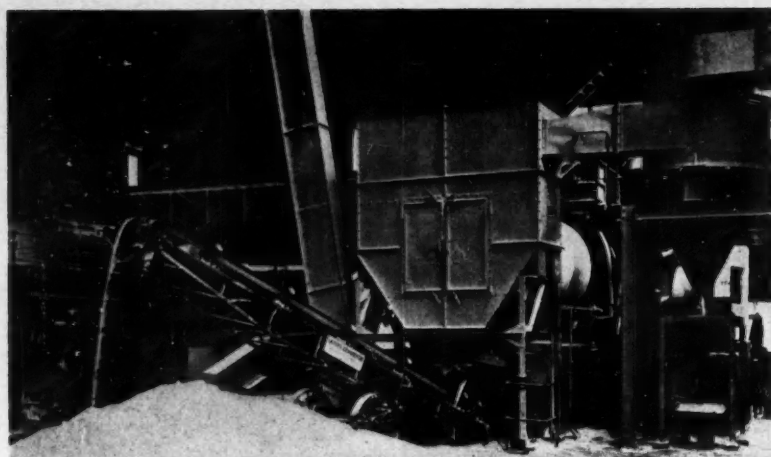
Water for the condensers, crude benzole and naphthalene stripping plants is obtained from the town water supply. For economy it is recirculated through a cooling tower, the blow-down being used for coke quenching. River water is used for the wash oil coolers at the benzole and naphthalene washing plants and for effluent liquor cooling on the ammonia scrubbers. This water is drained back to the river.

As a safeguard against failure of the town supply the cooling tower base serves as a reservoir holding some 115,000 gallons. Further reserves are provided by two 50,000-gallon tanks at the top of the service bunker and an 86,000-gallon tank at ground level.

For rapid access to overhead working positions which can only be reached with difficulty or waste of time by conventional methods such as ladders, scaffolding, bosun's chairs etc., a Simon hydrau-



*Crude benzole plant and naphthalene settling house*



Sulphate house, showing Dunford and Elliott dryer

lic Platform is being used at this plant. This machine is manufactured by another company of the Simon engineering group, Simon Engineering (Midlands) Ltd. It consists of a lorry-mounted turntable with two articulated hydraulically-operated booms carrying a working platform which accommodates two men and

their tools and tackle. Rotation of the turntable and lateral and vertical movements of the booms can be controlled either from the platform itself or from the turntable. The model in use at this coking and by-products plant provides a maximum working height of 40 feet and a maximum working radius of 26 feet.

## A & W's Main Research Effort Will be on Phosphorus Derivatives

MORE THAN half the sales of the year 1956 of the UK companies of Albright and Wilson Ltd. were in products not made by the organisation in 1946. Sodium tripolyphosphate and the silicoes, among the additions of the past 10 years, are now regarded as major products. This was stated by Mr. Kenneth H. Wilson in his annual report.

The group's main research effort continues to be devoted to phosphorus derivatives, notably in the promising field of organic phosphorus compounds for which additional plant is to be installed this year. Capital expenditure in 1956 of the UK companies amounted to about £1,250,000. Among processes extended or improved were those for the manufacture of oil additive concentrates, dicalcium phosphate, phosphorous acid and carbon tetrachloride. Main items of capital expenditure at Whitehaven, were additions to sodium tripolyphosphate capacity and expansion of the methyl ester plant. The new research laboratory will be fully equipped by the early summer.

### Sales Office Moves

Head sales office of Albright and Wilson (Manufacturing) Ltd. and the London office of Albright and Wilson Ltd. moved to larger premises on 6 May at 1 Knightsbridge Green, London SW1 (Kensington 3422). The head sales office comprises the following departments: alkali phosphate, domestic, fine chemicals, food phosphate, general chemicals, Kanigen, metal finishing, organic chemicals, export, and sales accounts; development, market research, publicity and information.

Head sales offices of the Antelope Co. and Clifford Christopherson and Co. Ltd.

and the London office of Proban Ltd. will also move to the new premises, which have been planned to allow room for further expansion.

## ICI to Modernise Cheshire Plants

PLANS TO extend and modernise the ICI plant at Lostock and Winnington (Cheshire), during the next few years at a cost of £7½ million were disclosed by Mr. J. K. Batty at a meeting of the Alkali Division Council. He recalled that at previous meetings he had referred to the possibility of a switch-over from caustic manufacture to ash manufacture, owing to the increasing demand for chlorine which brought with it as a by-product the manufacture of an equivalent tonnage of electrolytic caustic soda.

The demand for ash was steadily increasing and, as the only producers in this country, they had to meet it. They could not wait for the prospect of switching over caustic to ash. Hence more ash had to be produced in the existing plants.

## Increase in UK Sulphuric Acid Output

PRODUCTION of sulphuric acid and oleum during the first quarter of this year totalled 605,728 tons of 100 per cent (chamber, tower and contact) compared with 593,509 tons in the same period last year. Tonnage of chamber, tower and contact used during the period was 364,308 (290,759 last year), while despatches totalled 335,018 tons (361,082).

UK consumption of sulphuric acid and oleum during January to March totalled 628,084 tons, an increase of 34,199 tons over the same period of 1956. Largest use, more than 25 per cent, was for superphosphates. These figures, published by the National Sulphuric Acid Association, are summarised below.

### SULPHURIC ACID AND OLEUM (Tons of 100% H<sub>2</sub>SO<sub>4</sub>)

	Chamber & Tower only	Contact only	Chamber, Tower & Contact
Stock 1 January ...	29,257	74,091	103,348
Production ...	139,690	466,038	605,728
Receipts ...	29,303	51,121	80,424
Oleum feed ...	—	1,125	1,125
Adjustments ...	+357	+404	+761
Use ...	108,192	256,116	364,308
Despatches ...	66,507	268,511	335,018
Stock 31 March ...	23,908	68,152	92,060
Total capacity represented ...	180,580	519,020	699,600
Percentage reduction ...	77.4	89.8	86.6

### CONSUMPTION

1 January to 31 March

Trade Uses	100% H <sub>2</sub> SO <sub>4</sub>	Tons
Accumulators ...	2,783	2,638
Agricultural purposes ...	865	485
Bromine ...	3,874	3,571
Clays (Fuller's Earth etc.) ...	3,230	2,624
Copper pickling ...	753	806
Dealers ...	3,426	3,218
Dichromate & chromic acid ...	3,614	4,482
Drugs & fine chemicals ...	4,279	5,064
Dyestuffs & intermediates ...	20,200	23,301
Explosives ...	5,540	4,926
Exports ...	902	1,901
Glue, gelatine & size ...	114	111
Hydrochloric acid ...	15,182	14,496
Hydrofluoric acid ...	3,465	2,898
Iron pickling (incl. tin plate) ...	32,234	31,823
Leather ...	1,294	1,260
Lithopone ...	4,400	4,452
Metal extraction ...	841	969
Oil refining & petroleum products ...	15,602	15,913
Oils (vegetable) ...	2,186	2,036
Paper, etc. ...	1,828	1,447
Phosphates (industrial) ...	149	131
Plastics, not otherwise classified ...	10,316	9,682
Rayon & transparent paper ...	74,416	74,912
Sewage ...	2,220	2,500
Soap, glycerine & detergents ...	18,498	21,942
Sugar refining ...	165	187
Sulphates of ammonia ...	78,638	83,756
Sulphates of copper, nickel etc. ...	6,886	7,149
Sulphate of magnesium ...	291	380
Superphosphates ...	147,109	159,609
Tar & benzole ...	6,345	6,625
Textile uses ...	4,848	4,942
Titanium dioxide ...	65,945	74,624
Unclassified ...	51,460	53,204
Total ...	593,885	628,084

Note.—These summaries exclude all Government plants.

### RAW MATERIALS

(Tons)

	Pyrites	Spent Oxide	Imported	Sulphur Recovered, H <sub>2</sub> S & Filter Cake	Zinc Concentrates	Anhydrite
Stock 1 Jan. ...	210,020	130,245	70,851	11,975	62,407	9,514
Receipts ...	97,691	65,885	79,030	8,585	46,812	190,554
Adjustments ...	+2,047	-645	+160	-539	-251	-916
Use ...	95,886	68,681	75,800	10,926	42,294	188,754
Despatches* ...	1,666	3,570	884	23	—	—
Stock 31 Mar. ...	212,206	123,234	73,357	9,072	66,674	10,398

\* Including uses for purposes other than sulphuric acid manufacture.



## Overseas News

### DU PONT SPENT \$157 MILLION ON PLANT EXPANSION IN 1956

**SALES**, earnings and dividends of E. I. du Pont de Nemours and Co. last year were the second highest in the company's history, exceeded only by the 1955 figures. Lower selling prices on some products and higher costs resulted in a lower profit margin. Net sales totalled \$1,888 million (\$1,909 million); net operating income was \$254 million (\$292 million); earnings per share were \$8.20 (\$9.26).

The annual report for 1956 shows that \$157 million, against \$119 million in 1955, was spent on improving and expanding plants and laboratories, as well as the building of new ones.

Sizeable expenditures were made on projects for nylon, tetraethyl lead antiknock compound, Neoprene, Orlon, titanium pigments, sulphuric acid, Alathon polythene resin, Hypalon synthetic rubber, vinyl acetate, Fabrilite coated fabrics, paints and thinners, Butacide polyvinyl butyral resin, Freon fluorinated compounds and cellophane.

Four new plants were completed and began operation during the last three months of the year. New nylon and Orlon staple plants are now being built at Richmond and Wanesboro, Virginia, and a plant for the production of pure silicon is being constructed at Brevard, North Carolina. A factory for the manufacture of titanium pigments is in hand at New Johnsonville, Tennessee. A new cellophane plant is to be put in hand this spring at Tecumseh, Kansas.

The new elastomer chemicals department was created early this year to permit management to devote full attention to the development of markets for the increasing number of elastomer products.

Three new laboratory buildings have recently been completed at the experimental station near Wilmington, Delaware. Each of the 11 industrial departments and the chemical and engineering departments now have facilities for long-range and fundamental research at this station.

Additional high energy radiation facilities are being constructed at the station to complement a two-million electron volt generator now being used to explore the effects of radiation on chemical reactions in the du Pont fields of interest. A new metals laboratory will permit more research in special metals, such as titanium.

#### US Chlorine-Caustic Soda Plant

Total chlorine output of the new chlorine-caustic soda plant being constructed by Kaiser Aluminium and Chemical Corp. at Gramercy, La., US, will be marketed by the industrial chemicals division of Olin Mathieson Chemical Corp. Scheduled for completion this autumn, the plant will have a capacity of 100 tons per day of chlorine

and equivalent caustic soda. The caustic will be used by Kaiser Aluminium in its new alumina manufacturing operation at Gramercy.

#### Italian Chemical Catalysts Plant Opened

A new plant to manufacture chemical catalysts and liquid bright gold for ceramic decoration was officially opened in Rome on 25 April by Industrie Engelhard S.p.A., the newest member of the Engelhard Industries group. All types of precious-metal catalysts for the petroleum, chemical, and pharmaceutical industries in Italy and nearby countries are being produced at the new factory.

#### Creosote For The Sudan

Controller of stores, Sudan Railways, Atbara, has invited tenders for the supply of 1,000 tons of creosote, high temperature type A to BSS 144. Prices should be quoted c.i.f., Port Sudan, and tenders should reach Atbara by noon on 22 May.

#### Consulting Bureau Set up at the Hague

The Industrial Liaison Bureau has been established at 3 Hofweg, The Hague, Holland, for the purpose of supplying consulting services to the chemical industry. One object is to supply information on new European developments to a selected number of US chemical manufacturers and to represent such companies on technical matters in Europe. Director at the Hague is Dr. J. W. H. Uytendogaart, a chemical engineer.

#### Fertiliser Factory for Spain

Empresa Nacional 'Calvo Sotelo,' General Pardinas 55, Apartado 867, Madrid, are to invest 425 million pesetas in a nitrogenous fertilisers factory. It is not known whether imported machinery will be required.

#### Revised Edition of Nuclides Chart Available

A second edition of 'The Trilinear Chart of Nuclides,' compiled by Dr. William H. Sullivan of Oak Ridge National Laboratory, is now being distributed. The chart presents up-to-date nuclear data in a comprehensive form in six categories: (1) alpha and beta stability and instability; (2) natural occurrence versus man-made production, coupled with a clear indication of the stable, naturally occurring isotopes; (3) special designation for fission products; (4) genetic relationships for decay; (5) degree

of certainty for the data presented; (6) presentation of physical data.

Copies are available from the Superintendent of Documents, US Government Printing Office, Washington 25, DC price \$2.00.

#### Italian Firm Produce New Synthetic Textile Fibre

Delfion, a new type of synthetic textile fibre, has been developed by Bombrini Parodi-Delfino Co., of Rome. It is said to be exceptionally strong in spite of its low specific gravity and to be more elastic than wool, cotton, or viscose. It absorbs less humidity than acetate rayon, cotton, silk, hemp, viscose rayon, or wool and for this reason, say the company, repels dirt, can be easily washed, dries quickly and does not wrinkle.

#### Pure Platinum in Graded Fuel Production

At the Tidewater Oil Co.'s new refinery near Wilmington, Delaware, US, pure platinum is to be used as a catalytic agent to produce motor and aeroplane fuels of higher grade.

A shipment of the catalyst valued at \$500,000 is now being processed. The platinum is impregnated into an inert material in the form of small pellets. The pellets will be inserted into the reformer unit, where they will effect molecular changes in the oil stocks. When the effect of the pellets wears out they can be regenerated for use again.

#### Selenium Exports From US

A statement from the Bureau of Foreign Commerce in Washington indicates that US exporters may now submit applications to export selenium metal, ferro selenium powder, selenium-containing chemical compounds, including pigments, and selenous acid. Export applications could only be filed between 15 March and 1 April previously. The new extension will allow exporters to have more time to take advantage of the 30,000 lb. export quota set for these products in the second quarter.

#### Sweden to Step Up Sulphur Recovery Rate

Before the 1939-45 war, sulphur in the form of brimstone and pyrites, remained predominantly an imported commodity for Sweden. Supplies were obtained from its Scandiavian neighbours and Spain.

Sulphur consumption in various forms in Sweden totals 330,000 tons annually, of which about 100,000 tons is in the form of brimstone, 220,000 tons sulphur in the form of pyrites and about 7,000 tons sulphur as by-product sulphuric acid. Nearly three-fifths of this tonnage is used by the pulp industry for sulphur dioxide and bleaching, sulphuric acid manufacture accounts for just over two-fifths. The rayon industry takes up about 10 per cent of output, metallurgical uses account for a further 5 per cent and the balance of 110,000 tons meets the requirements mainly of chemicals, explosives, plastics etc. Sulphuric acid production including about 400,000 tons per annum which is

provided by the producers, two of whom manufacture fertilisers exclusively.

Just over one-third of Sweden's sulphur requirements is imported, Norway being the chief supplier (40,000 tons brimstone and 50,000 tons sulphur in pyrites annually). Brimstone imports from Italy, Chile and Mexico in 1956 totalled 79,000 tons. Domestic production of sulphur is stated to be stable at about 215,000 tons sulphur in pyrites, 30,000 tons recovered brimstone and 15,000 tons sulphur in by-product sulphuric acid from smelter gases.

As Sweden's sulphur output is wholly a by-product of the primary oil refining or beneficiation and metallurgical operations relatively low cost products are obtained which can readily meet competition.

Sweden's rising sulphur needs may include before long sizeable acid requirements for uranium ore leaching. These are likely to be sought in the form of brimstone from overseas sources of supply although it is suggested that envisaged expansion of sulphur recovery facilities is likely to close the supply gap before 1960 (*Quarterly Bulletin No. 16 The British Sulphur Corporation Ltd., p. 3*).

### Lube Oil Additives by Olin Mathieson

Two new lube oil additives for viscosity index improvement which have good resistance to shear breakdown are being offered by the industrial chemicals division of Olin Mathieson Chemical Corp., Baltimore, Md. Called Omavis 10 and 20, the products are the first in a new series of additives developed in the company's laboratories at New Haven, Conn. Other members of the series will be announced later.

### Eire to have £10 m. Refinery

Construction of the new £10 million refinery at Whitegate, County Cork, Eire, is to be started in the late summer or autumn of this year. It should be completed by 1959.

In a recent statement, the chairman of the working committee representing the California, Texas Corporation, Esso Petroleum Company, and Shell-Mex and BP, Mr. N. P. Biggs, said that contracts for construction of the main process units and certain off-site facilities for the refinery had been placed with the Lummus Company.

In process of formation is a new company, registered in the Republic of Ireland which will own and operate the refinery.

### Indian Standard for Graduated Measuring Cylinders

An Indian Standard Specification for Graduated Measuring Cylinders has been published by the Indian Standards Institution. The standard prescribes the requirements of a range of graduated measuring cylinders, stoppered and unstoppered, suitable for laboratory use. A test for neutrality is also given and five tables describe: tolerance on capacity; overall height and diameter of the base of the cylinders; dimensions recommended for necks of graduated measuring

cylinders; length of scale of graduated measuring cylinders; and subdivision of graduated measuring cylinders.

This standard has been prepared by the Indian Standards Institution's Glassware Sectional Committee.

### Union Carbide Expand Vinyl Foam Interests

Plans for greater activity in the vinyl foam field are announced by Union Carbide Corporation, New York. The Corporation has obtained the patents and experimental equipment of Elastomer Chemical Corporation in that field. Numerous foreign and domestic licences have been granted under the patents, and Union Carbide propose to offer additional licences and to make available to licensees technical developments in the production of the foam to increase its commercial acceptance. This activity will come under the product and process development department of Bakelite Co., a division of Union Carbide.

The current market for vinyl foam is about 3 million pounds a year and within the next few years the material is expected to make considerable headway in the resilient foam industry, the total market for which is now in the neighbourhood of 260 million pounds a year.

### 12% Increase in Canadian Chemical Production

Canadian production of chemicals was valued at \$339,677,000 in 1955, an increase of more than 21 per cent over the preceding year's \$279,846,000, according to the Bureau of Statistics annual report on the acids, alkalis and salts industry, just issued.

Factory selling value of organic chemicals rose to \$82,934,000 from \$72,936,000 in 1954, fertiliser chemicals to \$59,746,000 from \$45,386,000, synthetic resins to \$49,430,000 from \$36,647,000, compressed and liquefied gases to \$38,951,000 from

\$33,723,000, sodium compounds to \$35,096,000 from \$30,664,000, acids to \$21,140,000 from \$19,174,000, calcium compounds to \$18,505,000 from \$16,469,000.

Shipments from the acids, alkalis and salts industry had a factory selling value of \$172,256,000 in 1955 against \$142,002,000 in 1954. The 45 plants in the industry employed 8,597 persons against 8,408, and their salaries and wages totalled \$35,548,000 against \$33,426,000.

Some of the chief products shipped by firms in the miscellaneous chemical products industry were: synthetic rubber, \$54,278,000 (\$45,509,000 in 1954); insecticides, \$6,735,000 (\$6,973,000); dry colours and pigments \$5,496,000 (\$4,629,000); automobile chemicals, \$5,139,000 (\$4,589,000); and textile and leather finishes \$3,546,000 (\$3,341,000).

### Euratom Isotopic Plant Unlikely

Construction of an isotopic separation plant for uranium, originally planned as one of the most urgent joint problems to be dealt with by the Euratom organisation, is now considered unlikely. Estimated cost of producing enriched uranium in Europe compared with buying the material from the US is said to be double the US price.

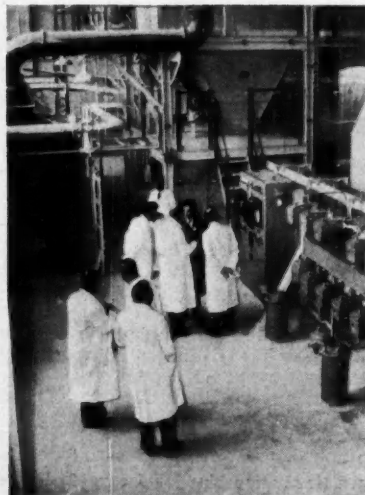
The funds which would be used to set up a separation plant for uranium, can, it is claimed, be used to better advantage for other purposes, particularly treatment of burnt-up fuel and fuel re-cycling.

Details of supply and price of enriched uranium to be released by the US Atomic Energy Commission are now known to Euratom following the visit to the US of the "Three wise men." (*CHEMICAL AGE* 2 March, p. 386 and 9 March, p. 415).

It is understood that the French wish to build an isotopic separation plant of their own if Euratom definitely decides to refuse to build such a plant.

## Fisons Open New Granulating Plant

A NEW granulating plant was recently opened at Cattedown, Plymouth, by Sir Clavering Fison, chairman of Fisons Ltd.



Situated on the site of one of the first chemical fertiliser plants in the UK, built by Charles Norrington just over a century ago, the new plant will produce granular fertilisers at the rate of 60,000 tons a year.

Three main buildings are included in the new enterprise. They are a store for raw materials and finished products, the building housing the granulating plant, and a building to accommodate the bagging plant.

The latest methods of fertiliser manufacture are included, with complete mechanisation and automatic control. None of the fertiliser materials are touched by hand during the whole time they are in the factory.

### BX Produce p.v.c./Terylene Fabric

By combining p.v.c. with Terylene, BX Plastics Ltd. have produced a new material which, they claim, has many possible applications. The material is suitable for h.f. welding and sewing and will be marketed in 40 yard rolls, 50-52 in. wide and 11 to 12 thousands of an inch thick.



## German Chemical Producers Keep Up High Investment Rate Need to Meet Growing Competition

**G**ERMANY's three leading chemical producers, the main successors of IG Farbenindustrie, have now published their full reports for 1956. All three disclose substantial increases in total sales and in exports—Farbenfabriken Bayer to DM 1,596 and 636 million, Badische Anilin- und Soda-Fabrik (BASF) to DM 1,498 and 520 million, and Farbwerke Hoechst to DM 1,480 and 448 million. Total sales were 11, 10 and 17 per cent respectively higher than in 1955; exports rose by 16, 13 and 18 per cent. Sales abroad thus improved even more than domestic sales but all three companies report keener competition and lower prices in foreign markets.

Average proceeds both at home and abroad were lower last year. Quantitative figures therefore indicated a somewhat larger turnover expansion than the above value figures. Bayer reports that sales of most groups of products rose by an average of 25 per cent by volume—plant protection chemicals by as much as 80 per cent.

Certain groups however were sold in smaller quantities; declines of as much as 15 per cent were recorded. While the rate of increase slowed down and many new plants reached the operative stage, BASF reports that some of the most important sections are still unable to meet all demands.

### Capital Expenditure

Capital expenditure on new plant etc. increased further last year and amounted to DM 269 million for Farbenfabriken Bayer, DM 287 million for BASF, and DM 242 million for Farbwerke Hoechst. As far as can be foreseen, investment this year will be somewhat smaller; BASF expects to spend DM 250 million on new plant, and Hoechst, DM 220 million.

Nevertheless all three companies consider an increase in their share capital imperative. Farbenfabriken Bayer which raised their capital last year from DM 387.7 to DM 550 million will ask shareholders for authorisation to increase it further to DM 750 million, the highest share capital of any German company. Badische Anilin- und Soda-Fabrik propose to increase their share capital from DM 510 to DM 612 million. Farbwerke Hoechst increased their capital last year from DM 385 to DM 462 million and will obtain DM 100 million this year through issue of debentures; the company does not for the present intend to make use of the authorisation to increase its share capital by another DM 100 million, but may have to do so somewhat later.

All three companies disclose greatly increased net profits—Bayer DM 55.0

(1955: 34.9) million, BASF 51.1 (38.4), and Hoechst 42.4 (31.8). The rate of dividend is raised by all three from 9 to 10 per cent. The labour forces of the three companies increased to 46,826 (end of 1955: 44,831), 36,625 (33,319) and 39,615 (36,135), their total assets to DM 1,738 (1,472), DM 1,639 (1,373) and DM 1,547 (1,343) million.

As regards current developments, Bayer report that the new 5,000 ton polyester fibre plant will be completed in July; plans have been prepared for its extension to a capacity of 10,000 tons next year. Another important plant now under construction is one employing the Lurgi-Ruhrgas oil cracking process. This Bayer plant at Dormagen will be ready for operation in the second half of 1958 and will supply ethylene, propylene, butylene and butadiene.

BASF reports that Rheinische Olefinwerke Wesseling (which is jointly owned by BASF and Deutsche Shell) will extend its polythene capacity at a cost of DM 140 million from 10,000 to 35,000 tons a year.

### Radioactive Substances

Farbwerke Hoechst is building a laboratory at Griesheim which will be concerned exclusively with the chemistry of radioactive substances, and intends to start production of heavy water at Höchst towards the end of this year. The production of anti-polyomyelitis vaccine by Behring at Marburg has been resumed and will by the end of 1957 be sufficient to meet all West German requirements.

Abroad special attention is being paid to the Latin American markets. Bayer report that the two subsidiaries in Brazil were merged at the end of 1956 in Bayer de Brasil Industrial Quimicas SA. A plant now being built by this company is expected to start production next year. The azo dye factory in Argentina has extended its production. Fensud, Buenos Aires, in which Bayer hold a minority interest, is expected to start production of synthetic phenol late this year. Coloidal SA, Buenos Aires, now a wholly-owned Bayer subsidiary, are to make tanning substances and agricultural chemicals. In Chile a new plant for processing and packaging pharmaceuticals has been set up. In Mexico, plants are to be erected near Mexico City for plant protection chemicals and textile printing inks. Bayer have also increased their interests in the US agricultural chemicals field and acquired an interest in a dyestuffs factory. Farbwerke Hoechst have completed processing and packaging plants in Chile, have started work on similar installations in Brazil, Mexico and Columbia, and propose to build similar plant in the Argentine.

Special interest naturally attaches to West European markets in connection with the 'common market' project. Far-

benfabriken Bayer, who now place 9 per cent of their total sales in common market countries and 10 per cent in other free trade zone market, foresee 'an essential stabilisation of business' as a result of increased co-operation. Professor Wurster of BASF confined himself to the remark that final judgment on the possible long-term consequences could not yet be passed. And Professor Winnacker of Hoechst said that 'desirable as European integration is from the political point of view, we should not light-heartedly over-commit ourselves in the field of economic policy'.

The first few months of the current year have seen a further expansion in sales, especially for Farbwerke Hoechst, and order books remain satisfactory. All three companies however suggest caution as regards the future because, on the one hand, the rate of expansion in the home market is likely to slow down during the period of consolidation into which the German economy has now entered and, on the other, the competitive situation abroad does not permit German manufacturers to pass on rising costs to foreign customers.

Attention is drawn to the disadvantage to German industry of high interest rates in the German capital market and comparatively low depreciation rates. In fact more than half the current capital expenditure on new plant and extensions is financed out of depreciation allowances.

The high rate of capital investment has helped to improve productivity only slightly, it seems. Bayer report that productivity last year rose by a little over three per cent, compared with an average increase in the cost of labour per hour of 11.3 per cent.

Another factor mentioned as causing concern are the heavy fluctuations in the flow of orders from some Asiatic countries. There was, for instance, a heavy fall in BASF shipments to China last year, while deliveries in the first four months of 1957 exceeded the total of the company's dyestuffs exports to China in 1956.

Great hopes are entertained for the younger sections of the chemical industry, especially for agricultural chemicals, plastics, lacquers and solvents, synthetic fibres, etc. Bayer report that nearly 40 per cent of sales in 1956 consisted of products not made before 1948; Hoechst state that 20 per cent of the turnover is in products which did not exist five years ago. All three companies however insist that further constant expansion of capacities all along the line is required to maintain the industry in a position to cope with all likely demands.

### Government Funds for Research

A Treasury memorandum on Civil estimates and those for Revenue departments published 1 May, states that £258,695,233 has been allotted for research and development, other than nuclear, in the current financial year. For security reasons, the amount provided for atomic research and development for civil purposes has not been revealed. The Ministry of Supply will receive £206.5 million, the Navy's research services £16,120,000 and DSIR £8,449,536.



## Chemist's Bookshelf

### 1956 CHROMATOGRAPHY CONFERENCE

The importance of statistical methods for the industries is recognized more and more, and in consequence the number of articles on this subject is ever growing. They are scattered in about 400 journals published all over the world. No industrial library could afford to subscribe to all of them. Comprehensive abstracts of all articles containing new information of lasting interest are published in the new

#### Abstract Service

### Quality Control and Applied Statistics

#### EDITORS:

Dr. Robert S. Titchen, Arnold J. Rosenthal, Bruce Bollerman and Frank Nistico

The Abstracts deal with Statistical Process Control; Sampling Principles and Plans; Management of Quality Control; Mathematical Statistics and Probability Theory; Experimentation and Correlation; Managerial Applications (Operations Research and Industrial Engineering Methodology); Process Control; Instrumentation.

There will be approximately 1200 pages in 12 issues annually. *Subscription price*; £21 per year, including postage and a special binder.

#### INTERSCIENCE PUBLISHERS LIMITED

80-90 Chancery Lane, London  
W.C.2

**VAPOUR PHASE CHROMATOGRAPHY.** Edited by D. H. Desty. Butterworths Scientific Publications, London. 1957. Pp. xv+436. 70s.

This volume contains a record of the 36 papers which were presented at a conference held in London at the end of May 1956. It is an important publication because the technique is achieving some remarkable results for the analysis of gases and volatile liquids and the developments which have taken place in the last two or three years have been substantial. A good indication of the interest and the possibilities of the technique may be obtained from the high proportion of the papers at this conference which have come from industrial establishments. There is a growing tendency for the proceedings of conferences to be published in book form and the desirability of this is not always clear. Consequently, it is a pleasure to find that this volume does contain a most useful collection of papers, nearly all of a high standard, and the volume should prove to be an invaluable source of information from many points of view.

The papers fall into three main groups. The first group is concerned with a number of the more fundamental aspects of the subject. These include the thermodynamics of gas-liquid chromatography, the evaluation of the factors determining the efficiency of columns for achieving separation, the evaluation of different liquids as stationary phases for obtaining good resolution and also the examination of the factors influencing the order of elution of different types of compounds.

The second group of papers is chiefly concerned with the means of detection of compounds after resolution in the column. This is clearly an important

branch of the subject because the usefulness of the technique for analytical purposes depends on the possibility of quantitative estimation of the small quantities of the substances which can be easily handled in columns. A variety of methods of detection are described and two or three papers deal with the question of detectors which will work satisfactorily at temperatures of the order of 300°C. This is an important development because the higher the temperature at which a column can be made to function the greater the number of liquids which are sufficiently volatile to be analysed or separated by the technique.

The third and largest group of papers deals with attempts to solve specific problems such as the analysis of fatty acids, alcohols, aromatic compounds, hydrocarbons and halogenated hydrocarbons etc. Although this group of papers is concerned with specific problems, there is a great deal of material in them which will be of general interest and will prove useful to others faced with different problems.

The volume also contains a record of the discussion which took place at the conference and the recommendations of a committee on the nomenclature which should be used and the manner in which new results should be presented. In view of the title of the volume it is perhaps surprising that the first of these recommendations should suggest that 'the term "Vapour Phase Chromatography" be no longer employed'.

The standard of the figures is high but it is a great pity that neither an author nor a subject index is included. Nevertheless, the volume can be recommended most strongly and should prove to be well worth the price.

C. KEMBALL.

### A Textbook for the Beginner

**INORGANIC MICROANALYSIS: QUALITATIVE AND QUANTITATIVE.** By R. Belcher and C. L. Wilson. 2nd Edition. Longmans, Green and Co., London. 1957. Pp. ix+153. 21s.

The earlier version of this textbook was published in 1946 under the title 'Qualitative Inorganic Microanalysis.' The new edition is a more comprehensive work in that it not only contains the revised qualitative schemes of the earlier text, but also has an extended scheme for the detection of cations without the use of hydrogen sulphide and a course on quantitative inorganic microanalysis which covers simple titrimetric, gravimetric and electro-deposition analysis.

This is a textbook for the beginner and not for the expert. There are many books on microanalysis, but generally they are not suited to the needs of the elementary student because they are packed full of

descriptions of the functioning of fairly complicated pieces of apparatus and deal with many of the more advanced instrumental methods of micro-analysis.

One of the chief merits of the present book is that it teaches in a crystal-clear yet detailed manner the fundamental techniques underlying the 'classical' methods, viz. how to handle minute amounts of titrant, how to filter small amounts of precipitate (qualitatively or quantitatively) and transfer them from one vessel to another, how to weigh micro-sized samples accurately etc. These are the fundamental issues involved in the teaching of microanalysis.

Both authors are well known for their intimate knowledge of microanalysis, and their ability as teachers of the micro-chemical art is mirrored in their new book. It is perhaps a pity that they did not expand the subject matter slightly by

including a historical introduction to the subject and some general examples of the applications of inorganic microanalysis in industry and research. Both aspects are important from the point of view of stimulating and sustaining the student's interest.

One of the snags involved in teaching quantitative microanalysis to large classes of students, particularly under crowded conditions, is the fragile and expensive nature of microbalances. The authors circumvent this difficulty by showing how sufficient sensitivity and reproducibility may be obtained using an ordinary analytical balance provided with a 5 mg. rider and a notched beam. This method works well for teaching purposes, and from a purely pedagogic viewpoint is preferable to the use of a modern direct reading microbalance because the student learns much about the functioning of the chemical balance which is, after all, the fundamental instrument of all forms of analysis.

The qualitative schemes cover some of the less familiar metal ions which are now

becoming increasingly important. These schemes are based on the authors' experience and this alone is an excellent recommendation for the book. The anion scheme is noteworthy in that it manages to be fairly comprehensive while remaining manageable in proportions and in the number of operations requiring to be carried out.

There is little to be criticised. On p. 60 part of the separation table appears to be incomplete and the two confirmatory tests given for zinc are virtually identical. The word 'turmeric' is spelt incorrectly on p. 28. Several tests are given for sodium and potassium but only the periodate test for lithium. The flame test might have served as a useful second if the other precipitation forms of lithium were regarded as unsatisfactory in sensitivity.

These are minor points in a book which can be thoroughly recommended to all those who wish to teach or learn the basic techniques of inorganic microanalysis.

T. S. WEST.

## Research for Farmers' Benefit

PLANT PROTECTION CONFERENCE 1956. Proceedings of the Second International Conference, Fernhurst Research Station, England. Butterworths Scientific Publications, London. Pp. xi+315. 50s.

This well produced volume contains the papers and discussions of Plant Protection Ltd.'s second International Conference, held at Fernhurst in June last year. A wide field of subjects is covered and it is particularly interesting to notice the broad canvas on which the Conference was painted. It might be expected that Plant Protection Ltd. would only be interested in those aspects of crop protection which are outlets for agricultural chemicals. This is by no means the case, and points still further to the tenet laid down by Sir Frederick Keeble 30 years ago that all research done by this organisation must be directed to the ultimate benefit of the farmer, as only in this way will it benefit the company, seeing that the interests of the company and its customers are identical. No better example could be given than this meeting.

The Conference was divided into six sections. The first was an admirable paper by Dr. J. G. Knoll of the FAO, who summarised the present world position of crop protection. He makes an interesting point in that the future biological workers on this subject should be strong in chemistry and that chemists should be strong in biology. In other words he calls for an intermingling of these sciences.

The next important section was devoted to the study of genetics in relation to crop production. That is, the creation of varieties of plants resistant to diseases and pests and the chemical therapeutants to use in the prevention of losses from pests.

The Conference then became more technical. Sections were devoted to the study of the mechanisms of toxicity which is the field in which fundamental knowledge is mainly needed and then systemic pesticides were dealt with: a class of substances which is only in its infancy and

which may play a great part in the future, as by this means it is possible for instance to kill one insect without killing its predators.

An important section was devoted to the question of residues of poisonous chemicals in food, a subject to which all chemists must be constantly alive, as certain new pesticides have intense biological activity.

Finally, the book deals with modern methods of application of pesticides, and this is the only section which cannot be as valuable as the actual Conference itself, as it is only a report of an actual demonstration of spraying and dusting equipment.

Plant Protection are to be congratulated on their foresight in giving such a conference, and Butterworth and the anonymous editor of the publication on the speed with which they have got the book into print.

GEORGE ORDISH.

## Author's Words Still True After 40 Years

CHEMISTRY IN THE SERVICE OF MAN. By Alexander Findlay. 8th Edition. Longmans, Green and Co. Ltd., London. 1957. Pp. xx+326. 25s.

'The mental outlook and the attitude of the people as a whole towards science must be changed and the scientific habit and a spirit of trust in science must be cultivated' said Dr. Findlay in 1916 in the preface to the first edition of 'Chemistry in the Service of Man.' Although it is over 40 years since these words were written they are still true.

The layman accepts all the good things that science has to offer—plastics, television, life-saving drugs and so on—but still regards the scientist as a potential danger, as someone who can change the whole pattern of life, who can even end life altogether, just by pressing a button. The scientist is in the position of a well paid but distrusted servant.

## Chemist's Bookshelf

Propaganda is necessary to counteract this point of view and one of the best methods is the publication of books on science which have a wide popular appeal. Dr. Findlay's book is a good example of this.

The latest edition has been revised and parts have been rewritten, and, claims the author, a considerable rearrangement of subject matter has resulted in the discussion being more closely knit.

Perhaps some good will be done if this book shows that scientific investigation is merely the result of the most human of all qualities, curiosity. J.P.S.J.

## Criteria of an Encyclopaedia

ENCYCLOPAEDIA OF CHEMICAL TECHNOLOGY. By R. E. Kirk and D. F. Othmer. Vol. 15 (Waxes to Zymosterol and Index). Interscience Publishers Inc., New York and London. Pp. xiv+936. 200s.

With this volume this remarkable work by Kirk and Othmer, the first volume of which appeared in 1948, is now complete. What are the criteria by which one assesses an encyclopaedia and in particular one which covers a field of science and technology? In the view of the writer the principal requirements of such a work are that the information should be very easy to find, that the coverage should be comprehensive and more inclined to the practical than the theoretical with sufficient references in each section to enable the enquirer to pursue a particular topic in detail. Conversely, it is suggested that to select a topic on which one has a special knowledge and judge the book by what is written on this subject is generally not only disappointing but, in this type of work, an unfair test.

Judged then in the above way, this book like other volumes that have preceded it in the series is admirable. The articles are well written in a clear style and cover a great deal of ground. The index is

## BOOKS ON THE CHEMICAL & ALLIED SCIENCES

CATALOGUE ON REQUEST. Foreign books obtained to order at the most favourable terms, with the least possible delay.

### SECONDHAND DEPT.

Select stock of recent editions of books on Science and Technology available. Back numbers of scientific journals obtainable.

### LENDING LIBRARY

Scientific and Technical

Annual Subscription from  
£1 17s 6d.

Prospectus post free on request.

THE LIBRARY CATALOGUE, revised to December, 1949, containing a classified Index of Authors and Subjects. To Subscribers, 10s. net. To Non-Subscribers, 17s. 6d. net. Postage 1s. 9d. Bi-monthly List of New Books and New Editions sent post free to subscribers on request.

LONDON: H. K. LEWIS & Co. Ltd.  
136, GOWER STREET, W.C.1  
Telephone: EUSTON 4282

## Chemist's Bookshelf

exhaustive and, although the subject matter is arranged alphabetically, is a most useful addition to the work. The value of this part may be judged by noting that the index contains 60,000 entries.

On the debit side one feels that an

encyclopaedia always dates and the subject matter of this one makes it at once particularly vulnerable and the fault a serious one, despite the supplementary volume which we are told is in course of preparation. Nevertheless this final volume is a fitting companion to what has already become a valuable work or reference.

D.C.F.

## The Power of Nuclear Weapons

**FACING THE ATOMIC FUTURE.** By E. W. Titterton. Macmillan and Co. Ltd., London. 1956. Pp. 379. 21s.

A great and far-reaching decision has just been made in this country concerning the future of atomic weapons and it is important, therefore, that as many people as possible should be aware of the consequences of this decision. From this point of view this book is most timely. The author who holds the chair of Nuclear Physics at the Australian National University has been closely connected with the development of nuclear power both at Los Alamos and at Harwell.

This is not the book of a scare-monger, a pacifist, nor is it a political document; nevertheless the sober analysis of the power of nuclear weapons and their tactical value, will be disturbing reading even to those familiar with the topic.

There are three sections dealing with the peaceful and military uses of atomic energy and the social and political problems connected with its development. In the first section the fission process is explained and the principle of the reactor discussed. The need of modern society for atomic power is examined with special reference to the main interested nations. Health hazards and the problems of disposal are dealt with and many will no doubt be distressed that this eminent authority can give little comfort on the atomic wastes problem.

### Atomic War Problems

The next section contains very precise accounts of the various atomic weapons and the difficulties associated with their use. His analysis of the problems of radiological warfare is particularly penetrating and his conclusions, on the whole, encouraging.

The last section examines the cost of extermination by the use of atomic weapons and provides the startling conclusion that atomic warfare is by far the cheapest, the figure per death being only a few shillings compared with thousands of pounds by the use of conventional weapons.

Finally, the political aspects of world control are reviewed and the history of attempts in this direction during the post-war period discussed. The author tells us how we may plan for an atomic war and how we may plan to survive it. While in some places he deals specifically with the problems of his own country his conclusions apply to all states large enough to live under the shadow.

This book should be given the greatest

possible publicity and should be read by the scientist and layman alike. They are both indebted to Professor Titterton for his most salutary warnings, his critical analysis of our present dilemma, and his authoritative advice.

J. R. MAJER.

## Synthesis of Topical Substances

**ORGANIC SYNTHESSES.** Vol. 36. Edited by N. J. Leonard. John Wiley and Son, New York. Chapman and Hall Ltd., London. 1956. Pp. 120. 36s.

The 36th member of this invaluable series upholds its reputation as a reliable source of interesting organic preparations. Among the 15 compounds dealt with in this volume are included such topical substances as cyclodecanone, ethyl diazoacetate, ferrocene, propionaldehyde and sebacin. Not the least useful property of these complications is the flow of fruitful ideas that their reading engenders.

R. A. RAPHAEL.

## Latest 'Vogel' up to Standard

**ELEMENTARY PRACTICAL ORGANIC CHEMISTRY.** By Arthur I. Vogel. Part 1: Small Scale Preparations. Longmans, Green and Co., London. 1957. Pp. xv + 347. 21s.

By using pear-shaped distillation flasks, combining two or more pieces of apparatus together and by making other modifications of orthodox macrochemical apparatus, the well-known author of this new book (the first of three volumes to be devoted to elementary practical organic chemistry) has designed and marketed an inexpensive set of small-scale borosilicate glass equipment which should appeal strongly to those teachers and lecturers who have not yet enjoyed the advantages of working in this way.

The work is divided into three main sections, devoted to theory, experimental technique and the actual preparations. A unique system of cross references welds all three firmly together.

By means of a full discussion of those principles of physical chemistry which underlie all practical organic work, the author makes it very clear that 'organic preps' are not synonymous with chemical cookery!

The comprehensive section on experimental technique includes filtration, cleaning and drying glassware (how fervently one commends the author's insist-

## Every Chemical Topic Covered

**THE ENCYCLOPEDIA OF CHEMISTRY.** Edited by George L. Clark, Gessner G. Hawley and William A. Hamor. Reinhold Publishing Corp., New York. Chapman and Hall Ltd., London 1957. Pp. xvi + 1,037. 156s.

One's first impression on glancing through this book is that it should be called 'The Encyclopedia of American Chemistry.' Its thousand-odd pages are devoted to short surveys of almost every conceivable chemical topic, contributed by over 500 US chemists and allied scientists.

This first impression is corrected after a further study when one realises that although the examples chosen to illustrate points are generally American the approach is international. The authors have, in most cases, managed to compress a vast range of information into a very small space and the result is both informative and readable.

One warning must be given. The reviewer suggests that no specialist reads the sections on his own subject. If he does he is bound to regard the treatment as inadequate and superficial. The only fair way to pass judgment on such a work is to study sections with which one is not well acquainted. In this way the book will provide a useful source of general chemical information.

Printing and production are good. The price is a little high for the private individual but the book should be a useful addition to the shelves of technical libraries.

J.P.S.J.

ence on cleanliness); methods of stirring; determination of melting points and boiling points; distillation under normal pressure and reduced pressure in steam and in superheated steam and the purification of organic solvents.

Practical instructions are full and clear and are usually preceded by a brief discussion of the reactions involved. Many interesting new preparations appear for the first time in any text book and incorporate important recent developments in organic syntheses, e.g. n-octane, n-valeric acid, acetamide (by heating together urea and acetic acid), quinoline (using iodine as the oxidising agent), p-toluic acid (using lithium) and 2:2:2: trichloroethanol (using potassium borohydride).

An interesting and unusual experiment included is the depolymerisation of nylon polymer 66 into adipic acid and the dibenzoyl derivative of hexamethylenediamine.

All teachers and lecturers working with National Certificate classes or preparing students for the Grad. A.R.I.C. and London B.Sc. examinations should examine this stimulating work. It is permeated throughout with the author's infectious enthusiasm and the keen intellectual pleasure which he derives from practical organic chemistry.

K. STUART.



**Chemist's Bookshelf****Semi-Micro Scale Analysis**

**INORGANIC QUALITATIVE ANALYSIS: SEMI-MICRO METHODS.** By *H. Holness*. 2nd edition. Sir Isaac Pitman and Sons Ltd., London. 1956. Pp. vii + 152. 12s 6d.

Since the war, there has been a definite trend in qualitative inorganic analysis towards the use of small-scale methods. In particular, the semi-micro scale has been found to be generally very suitable to the various degrees of manipulative ability. This trend is evident in universities, technical colleges, and even in grammar schools. A change of this type, however, requires the availability of suitable books of instruction. Among the latter may be classed the book under review, the first edition of which appeared in 1954 and is now well-recognised as a useful practical guide.

This new edition has undergone few major changes. The same general plan of the first edition persists. Chapters on semi-micro apparatus and technique, preliminary tests, preparation of the solution, and treatment of insoluble residue are followed by the procedure for separation into groups, and for examination of the groups. The examination of individual acid radicles and special mixtures of acid radicles is also outlined.

The main changes which have taken place are the precipitation of the elements of group 5, the separation of antimony and tin by precipitation of antimonous sulphide quantitatively with hydrogen sulphide in 4N acid solution, the confirmation of the presence of tin with one per cent tannin solution, and the use of an aqueous solution of hydrogen fluoride to precipitate calcium and separate it from strontium.

To some extent the process of analysis has been made more systematic by the small modifications and, as an introduction to the semi-micro scale of working, the book is a valuable asset.

R. J. MAGEE.

**A 'Source Book' on Steric Effects**

**STERIC EFFECTS IN ORGANIC CHEMISTRY.** Edited by *M. S. Newman*. John Wiley and Son, New York. Chapman and Hall Ltd., London. 1956. Pp. 710. 100s.

Probably one of the main reorientations that a new research worker in organic chemistry has to undergo is the rueful realisation that the concept of the 'typical reactions' of an organic chemical class is in many cases merely a text-book convenience of purely qualitative value. One of the elements conducive to this lack of uniformity is the shape and size of the molecule under study.

Such steric effects have of course been known for a long time and indeed have served as a convenient dumping-ground to accommodate a wide variety of untypical chemical behaviour. It is only comparatively recently, however, that serious investigations on the quantitative or semi-

quantitative aspects of steric effects have been undertaken.

The present volume serves a most useful purpose as a source book to this work and also provides a stimulating critical survey of the various findings. The chapters are written by recognised authorities and the large amount of quantitative information incorporated in tabular form is most welcome. The problem of delineating three-dimensional structures on a two-dimensional page has a number of solutions. This publication has wisely not chosen one exclusively but in each case has used the method best adapted to illustrate the point in question.

R. A. RAPHAEL.

**BP Chairman Reports on Petrochemical Progress at Grangemouth**

MANUFACTURE of chemicals from petroleum feedstocks is expanding rapidly in the three associated companies of the British Petroleum Co. at Grangemouth, states the company's chairman, Mr. N. A. Gass in his report to stockholders.

Cracking capacity for olefine production at the plant of British Hydrocarbon Chemicals Ltd., has been doubled and ethylene is now being manufactured at the rate of 60,000 tons a year. The ethylene is mostly used in the manufacture of industrial alcohol, the plants for which have been increased. Liquid products from the butadiene plant now in operation, are being despatched to producers of synthetic rubber and other polymers. Also recently commissioned is a large catalytic polymerisation unit for propylene tetramer.

Extensions at Forth Chemicals Ltd., have trebled the capacity for styrene monomer, Mr. Gass reports.

Very high quality detergent alkylate is being produced at Grange Chemicals Ltd., at well above designed output capacity.

**QVF Complete First of Development Programme**

COMPLETION of the first stage of their development programme at Fenton, Stoke-on-Trent, was marked by Q.V.F. Ltd., by an informal reception on Friday, 3 May.

The new premises total 60,000 ft. and will be used initially for office accommodation, stores, warehouses and for accommodating a new dispatch department and a new technical development section. A chemical plant erection department where large glass installations will be assembled for final checking and inspection before dispatch to customers will also be included.

Speaking at the reception, Mr. B. H. Turpin, managing director, said this was the completion of the first stage in the development of the premises. The second stage was proceeding with the equipping of a further 30,000 sq. ft. of floor space for carrying stocks of glassware.

In all these three plants are expected to produce 150,000 tons of chemical intermediates during 1957, in addition to high-grade motor spirit and other hydrocarbon products. Mr. Gass also reports that plans are in hand for further extensions to produce polythene and other intermediates for the organic chemical industry.

In France, Société Française des Pétroles BP now has an increased holding in Naphtachimie, which manufactures petrochemicals at Lavera. Operations have been increased at Naphtachimie and olefine production capacity is being substantially increased. Construction of a polythene plant has begun.

**ICI Titanium Works**

Work on the main building of Imperial Chemical Industries' new £2 million titanium fabrication works at Waunarlwydd, Swansea, is almost complete and plant is being installed. Electrical furnaces and the first unit of the sheet rolling equipment are now in operation.

**Mobile Calibration Unit on Show**

This glass reinforced plastics caravan, fitted out as a mobile calibration unit, is the main feature of the Costain - John Brown instrumentation division exhibit at the Instruments, Electronics and Automation Exhibition at Olympia. Visitors to the stand will be able to inspect the nearby workshops



# Canadian Expansion in Chemicals and Petrochemicals

## Many Plants on Stream This Year

CANADIAN output of chemicals and allied products again showed a rise in 1956, the estimated value of factory shipments over the first 11 months at \$1,020 million showing an advance of about \$70 million over the corresponding period of 1955. Imports rose by \$28 million to \$243 million (10 months' figures), most of the increase being due to industrial and processed chemicals and synthetic resins. There was a 10 per cent increase in imports of fertilisers (\$11.4 million) and imports of pharmaceuticals and medicines regained the 1954 level (\$22 million). UK chemical sales, however, only rose from £7.8 million to £8.3 million, and the rate of expansion was only about half that of total imports, with the UK losing ground to the US in the market as a whole.

### BoT Report

In a report (BoT Export Services Branch Special Register, prepared by the UK Trade Commissioner Service in Canada) the prospects of the Canadian chemical and petrochemical industries are reviewed (Gen/3389, 3 May). The great expansion of capacity in the chemical industry proper is noted in the new plants being constructed and due in many instances to come into operation this year. The emphasis is still on the development of the production of materials used in and provided by the forest, mining and oil industries. Thus, an ammonia plant of 200 tons daily capacity of Canadian Industries Ltd., will be in operation this year at Millhaven, Ontario. Later this year this company will have in production a \$3 million plant at Sudbury which will convert waste sulphur gas from the International Nickel Company's new iron plant into sulphuric acid at the rate of 300 tons daily. The acid is required in the Blind River uranium area.

An acrylic fibre plant at Maitland, Ontario, by the Du Pont Company of Canada should be in operation this year as also a new unit to produce xylenes resins. Du Pont will also have a commercial explosives plant at North Bay in operation and engineering studies are being carried out for a hydrogen peroxide plant.

The Electric Reduction Company of Canada's new \$5 million sodium chlorate plant at Vancouver should be in operation shortly and construction is under way at Hamilton of a new \$5 million plant for production of phosphates and phosphoric acid.

Projects under way by North American Cyanamide Ltd. include the manufacture of xanthates for the mining industry, amino-triazole for use in herbicides and, lime for uranium processing. They will also be expanding existing production of liquid nitrogen.

Planned for the middle of 1958, is a

plant for anhydrous ammonia, having an annual capacity of 52,500 tons, and urea, 66,000 tons annually. Hydrogen and nitrogen will be supplied by the Dominion Foundries and Steel Oxygen plant at Hamilton. Another ammonia plant is planned by the Quebec Ammonia Company for Brockville. In this case the ammonia is required for nylon manufacture and refrigeration gas.

Nicholl's Chemical Company have announced plans for the first Canadian plant to produce hydrofluoric acid. This plant will be set up at Valley Field, Quebec. In this same area, a \$5½ million catalyst production plant by Davison Chemical Ltd., should be in operation by this summer. Also scheduled for completion this year is the \$3½ million plant at Niagara Falls of BF Goodrich Co. Ltd., for the manufacture of Geon polyvinyl plastics.

The first Canadian titanium plant, by Canadian Titanium Pigments Ltd., is to be completed by the middle of this year, and Quebec Iron and Titanium Corporation will be increasing their output of titanium dioxide slag under a \$60 million expansion programme.

### Lithium Chemicals

With a view to producing lithium chemicals at a later stage, Quebec Lithium Corporation will be extending its range of lithium concentrates. The activities of Shawinigan Chemicals Ltd. in Canada were reviewed, in *CHEMICAL AGE*, 6 April, p. 613.

The Canadian petrochemicals industry is now moving from dependence on waste gas from oil refineries to operations closely integrated with actual refin-

ing processes. Now, too, as natural gas in the Prairies is being developed, the industry can expand on a wider front still.

At Sarnia, Canadian Oil Co. Ltd., are constructing a \$3 million Udex plant for extracting benzene, toluene and xylene from petroleum. Also at Sarnia, Imperial Oil Ltd. are building, in addition to a new detergent alkylate unit, a \$25 million plant for producing a full range of basic petroleum chemicals including the first private production of butadiene in Canada. This plant is expected to be in operation in 1958 and may well provide the basis for polythene production by the Du Pont Company of Canada. Union Carbide Canada Ltd., in Montreal, have increased the capacity of their new polythene plant. A new unit will produce ethanolamines, glycol ethers and polyglycols.

### Elemental Sulphur

By June of this year Laurentide Chemical Sulphur Co. should have in operation a 30,000 ton plant using refinery gases for the first commercial production of elemental sulphur in Eastern Canada.

Production of *n*-butanol, *n*-butyl acetate etc., has been greatly expanded and further major expansions are to be based on increased supplies of hydrocarbons obtained from plants undertaking the cleaning of 'wet' natural gas. Thus, the Pincher Creek gas field when in full production will provide 8,000 barrels of condensates and 800 tons of sulphur daily. It already supplies the new fertiliser plant of Northwest Nitrate Chemicals Ltd. at Medicine Hat.

River Peace gas is to be processed at a plant now under construction at Fort St. John, British Columbia. It is estimated that it will provide 300 barrels of propane and 600 barrels of butane daily as well as 275 tons of sulphur.

Major chemical companies are stated to be considering the economics of petrochemical plants in the Fort St. John area and in Alberta, synthetic rubber producer, Crown Corporation, has acquired a site for a \$30 million butadiene plant.

## New Shell Haven Office Block

RECENTLY completed at Shell Haven refinery, Essex, is a new office building, costing £300,000, to house the 300 administrative personnel on this Shell Petroleum site. Construction programmes under way have made the additional accommodation necessary.

At present the oil refining facilities are being expanded at a cost of over £6½ mil-

lion and chemical manufacturing, particularly in the field of nitrogen chemistry, is being developed at a cost of a further £6½ million.

The main building is 295 ft. long, 40 ft. wide and consists of three storeys with staircase towers at front and rear. Work on the building began in September 1955.



● Mr. H. SHITH will relinquish his post as superintendent at the Kinlochleven routine laboratory of the British Aluminium Co. Ltd., with effect from the 31 May, on becoming laboratory superintendent at the Baie Comeau Works of the Canadian British Aluminium Co. Mr. W. McCAMLEY of Kinlochleven Research Department will succeed Mr. H. Smith as superintendent at Kinlochleven.

● At the annual meeting of the British Wrapped Rubber Hose Manufacturers' Association held recently Mr. D. P. G. MOSELEY (David Moseley and Sons Ltd.) was re-elected chairman; Mr. P. L. SHERWOOD (Wm. Warne and Co. Ltd.) was re-elected vice-chairman.

● Mr. OSCAR SWAN, managing director of William Palfrey Ltd., 24 City Road, London EC1, manufacturers of multi-wall paper sacks, has left for the US to study at first hand new developments both in manufacturing processes and technique in the multi-wall paper sack industry, and in the uses to which the sacks are put.

● Mr. WALTER HINDLE, a leading US authority on the dyeing and finishing of textiles, particularly man-made fibres, gave a talk on Monday, 6 May in Nottingham on the dyeing and finishing of Acrilan and its various blends for use in finished fabrics. Mr. Hindle is associate director of research and development for the Chemstrand Corporation and is in charge of textile research. Yorkshire-born, he received his early textile training at the Manchester College of Technology.

● Mr. J. E. CLARK, formerly on the staff of British Oxygen Wimpey Ltd., has been appointed deputy manager of the Midlands district of British Oxygen Gases Ltd., with headquarters in Birmingham.

● Mr. G. N. HODSON (Hathernware Ltd., Loughborough, Leics) was re-elected chairman of the British Chemical Plant Manufacturers' Association at the 37th annual meeting held in London on 1 May.



G. N. Hodson

Other officers elected were: *vice-chairmen*, N. C. FRASER (W. J. Fraser and Co. Ltd., Harold Hill, Essex), R. W. RUTHERFORD (Power-Gas Corporation Ltd., Stockton-on-Tees) and P. W. SELIGMAN (The APV Co. Ltd., Crawley); *hon. treasurer*, MARK WYNDHAM (Bennett Sons and Shears Ltd., London W1); *council*: P. D. DOULTON (Matthew Hall and Co. Ltd., London NW1); H. W. FENDER (Prodorite Ltd., Wednesbury); E. S. FRANKLIN (Torrance and Sons Ltd., Bitton, near Bristol); N. C. FRASER; DR. M. GUTER (Costain-John Brown Ltd., London W1);

## People in the NEWS

DR. R. LESSING (The Hydronyl Syndicate Ltd., London SW7); G. W. RILEY (George Scott and Son (London) Ltd., Leven, Fife); R. W. RUTHERFORD; P. W. SELIGMAN; R. F. STEWART (Dorr-Oliver Co. Ltd., London SW1).

● The Counties Public Health Laboratories, 66 Victoria Street, London SW1, announce that Mr. R. F. RACKHAM, who joined the staff in 1947, has now entered into partnership. Mr. W. H. HOATHER is advisor on the measurement of radioactivity in relation to their usual fields of work. Other recent appointments to the staff of these laboratories include Mr. E. ENGLISH and Mr. A. FOX.

● Mr. FRANK W. REINHART, chief of the plastics section at the National Bureau of Standards, has been awarded the Department of Commerce Silver Medal for meritorious service. The award recognised his major contributions to the science and technology of plastics, and for highly distinguished authorship. Mr. Reinhart, a nationally known authority in the field of plastics, directs the Bureau's diverse research, development and testing programme on plastics, plastics coatings and adhesives. Among the recent developments of this programme are plastics springs which have a higher strength-to-weight ratio than most metal springs.

● New manager of the chemical division application laboratory of Celanese Corporation of America at the company's Summit (NJ) research laboratories is Mr. BRUCE C. AINSWORTH. He succeeds Dr. MICHAEL J. CURRY who recently was made laboratory manager of Summit's co-ordinated fibre, plastics and chemical research facilities.

● Mr. JOHN W. THROCKMORTON, vice-president of Petro-Chem Development Co. of New York, manufacturers of Petro-Chem Iso-Flow fluid heating furnaces, is visiting Europe, touring refineries and chemical plants. While in Europe, he will visit his licensees for Britain and the Commonwealth, Birwelco Ltd., Chester Street, Aston, Birmingham. He will also visit Germany in company

with Mr. R. G. LEWIS, general manager of Birwelco Ltd.

● A committee has been set up by the Northern Regional Board for Industry to consider future man-power needs in the Tees-side area. The step is a result of a request for information received by the Board from Dr. S. W. SAUNDERS, joint managing director of Imperial Chemical Industries, Billingham division, who referred to the rapid and continued growth of industry on Tees-side since the war.

● On his resignation from the council of the Pharmaceutical Society of Great Britain, Dr. J. A. GILES, one of three members nominated by the Privy Council, has been elected an hon. member in recognition of his distinguished services to the society and to pharmacy. The council have presented him with a gold wristlet watch as a souvenir of the work he did as a member.

● New deputy chairman of Gas Purification and Chemical Co. is Mr. L. L. ROSSITER. Mr. Rossiter has resigned his partnership in Clifford-Turner and Co.

● Mr. DAVID H. PEACE, manager of the plant sales division of the British Ceca Co. Ltd., has been awarded a Travel Grant to visit Australia under the auspices



D. H. Peace

of the English Speaking Union. This is the first of these travel grants for young UK businessmen to be awarded for Australia. Mr. Peace, who will spend six weeks in Australia, will visit all the main centres and State capitals as well as many industrial undertakings.

● Mr. L. A. BLACKBURN has retired from the board of Willows Francis Pharmaceutical Products Ltd., Shacklewell Lane, London E8, for health reasons.

### Obituary

The death occurred on 27 April of Mr. ARTHUR HARVEY, editor of the *Journal of the Society of Leather Trades' Chemists* and hon. secretary of the International Union of Leather Chemists' Societies. He was 62. Mr. Harvey was prominent in the formation and management of the International Union of Leather Chemists' Societies.

The death occurred on 26 April of Dr. G. E. FOXWELL at the age of 64. Dr. Foxwell began his career with the Koppers Coke Oven and By-Product Company, Sheffield, in 1912 as a junior chemist. In 1924 he became senior research chemist of the Gas Light and Coke Company. Since 1933 he was on the business side of Clayton Son and Company of Leeds, gas and constructional engineers. He was an active member of many professional bodies including The Institution of Chemical Engineers.



# It pays to have the facts at your fingertips . . .

Add this extremely useful publication to your technical library. Have all data ready to hand on the grades of Oleines, Stearines, Fatty Acids and Fatty Alcohols most in demand.

This up-to-date ready reference booklet 'Specifications and Characteristics of Oleines, Stearines, Fatty Acids and Fatty Alcohols' comes to you with the compliments of Price's (Bromborough) Ltd. A copy will be sent to you on request—without charge, of course.

**So get your FREE copy now**



#### AT YOUR SERVICE

Our sales representatives and technical sales service department are at your disposal to discuss your particular requirements and any problems that may arise.

OLEINES • STEARINES • FATTY ACIDS • FATTY ALCOHOLS

## SPECIFICATIONS

AND CHARACTERISTICS

PRICE'S (BROMBOROUGH) LIMITED

# PRICE'S (BROMBOROUGH) LIMITED



## Commercial News

# Start of Reichhold Phthalic Anhydride Plant Frustrated

IN HIS annual statement for 1956 Mr. Walter H. Breuer, chairman of Reichhold Chemicals Ltd., reports that the operating companies continued to expand their sales, particularly in the fields of glass fibre, reinforced plastics and vinyl polymers. Profit margins, however, have been reduced by substantial increases in overheads, wages, salaries, heating, transport etc.

Because of the reduced profits, and increased rate of profits tax, the cash bonus is to be reduced to 2½ per cent. A final dividend of 10 per cent is to be paid, making a total distribution of 20 per cent (22½ per cent).

The chairman reports that due to continued delays in delivery of component parts of the phthalic anhydride plant, the company's hopes of deriving benefit from the production of this essential raw material in 1956 have been frustrated. Production should, however, start shortly.

Close association with Reichhold Chemicals Inc., US, and its associated companies throughout the world, has resulted in frequent exchanges of technical information. A reciprocal agreement concluded with Reichhold Chemicals Inc. and associated companies involving commissions to the Beck Koller Company has also been beneficial.

## Bowater Research Company

The Bowater group have formed the Bowater Research and Development Co. Ltd., with headquarters at Northfleet, Kent, adjoining their Thames paper mill. In its recently completed laboratories, the new company will conduct the research activities in the UK of the Bowater Paper Corporation Ltd. Close contact will be maintained with the recently formed Bowaters Research and Development Incorporated, Tennessee, US.

## Permutit Company

An increase in dividend from 12½ to 15 per cent has been announced by the Permutit Company for 1956, on £750,000 ordinary capital (£500,000 in 1955 prior to one-for-two rights issue at 10s per 5s share in July last). Net profit, after tax and crediting £12,786 adjustments relating to previous years, increased to £248,663 from £215,138. £165,000 (£150,000) has been placed to the general reserve.

Permutit has important contracts for its ion-exchange uranium extraction plants in South Africa, Rhodesia, Australia and Canada (news of the ion-exchange process as applied to the extraction of uranium oxide from metallic ores was released last autumn). Because of the important implications of this process the chairman's statement this year is awaited with interest.

## William Blythe and Co.

At the annual general meeting of William Blythe and Co. (see also CHEMICAL AGE 13 April, p. 650), the chairman said that the dividend decision (25 per cent, same as 1955; bonus nil, 5 per cent in 1955) did not arise from any disappointment with results of the first quarter of this year, which have been very satisfactory. It had been made in order to enable maintenance of the policy of financing expansion and development out of profits.

## NEW COMPANIES

CATYLATORS LTD. Cap. £10,000. Manufacturers of chemical apparatus and machinery and engineering, and electrical equipment of all kinds etc. Directors: R. J. Glass and B. Ingram (directors of Ingram and Glass Ltd.), and H. M. Harmer and W. E. Simmons (directors of Harmer and Simmons Ltd.). Reg. offices: Weydown Road, Haslemere, Surrey.

CHEMICAL PROJECTS LTD. Capital £1,000. To undertake and execute contracts for works involving design, supply, installation, management and operation of factories, plant, machinery and equipment for manufacturing chemicals etc. Subscribers are: A. J. H. Weber, and E. R. Clericetti, St. Swithins House, Walbrook, London EC4.

## INCREASE OF CAPITAL

METACHEMICAL PROCESSES LTD., 41-3 Gatwick Road, Crawley. Increased by £2,000, beyond the registered capital of £20,000.

## CHANGE OF NAME

CYANAMID PRODUCTS LTD., Bush House, London WC2. Named changed to Cyanamid of Great Britain Ltd.

## RELEASE OF RECEIVER

ARLEE LTD., chemical manufacturers etc., 132 Cheapside, London EC2. Mr. M. D. Green, 9 Grays Inn Square, London WC1, ceased to act as receiver and/or manager on 29 February.

## MORTGAGES & CHARGES

F. COLLINS LTD., Lytham, chemical merchants etc. 1 April, charge, to Barclays Bank Ltd. securing all moneys due or to become due to the bank; charged on 21 Sandy Lane, Prestwich, and any rent/s charge's etc.

DURABLE PLASTICS LTD. Guildford. 27 March, £15,000 mortgage, to Eagle Star Insurance Co. Ltd.; charged on land and factory premises at Station Meadows Industrial Estate, Guildford.

LEDA CHEMICALS LTD., London W. 13 March, charge, to Midland Bank Ltd., securing all moneys due or to become due to the Bank; general charge.

POLYMER CONSULTANTS LTD., London EC. 4 April, £2,000 debts, part of a series already registered.

RAYHAM DEVELOPMENTS LTD., London SE, scientific instrument makers. 12 March, £1,700 and £200 debentures respectively to Pelling and Cross Ltd., and A. T. Boreham, London; general charges.

## SATISFACTIONS

BRITISH CELANESE LTD., London W. Satisfactions 28 March, of debentures stock registered 2 October 1943 and 8 November 1944, to the extent of £7,989 and of debentures stock registered 24 September 1946, to the extent of £10,085.

C. AND C. MARSHALL LTD. London N, plastics. Satisfaction 11 March, of charge registered 19 October 1949.

HINCKLEY DYE WORKS LTD. Satisfactions 5 April, of mortgage reg. 26 September 1939 and charge reg. 23 March 1949.

WILLIAM RANSOM AND SON LTD., Hitchin, manufacturing chemists. Satisfaction 9 April, of charge reg. 6 October 1950.

## LONDON GAZETTE

### Voluntary Winding-up

(A resolution for the voluntary winding up of a company does not necessarily imply liabilities. Frequently it is for purposes of internal reconstruction and notice is purely formal.)

LONDON MOULDERS LTD., manufacturers of chemical products, reg. office, 31 Kings Road, Sloane Square, London SW3. C. E. Suram, 31 Kings Road SW3, appointed liquidator, 18 April, to succeed E. Phillips resigned owing to ill-health.

P. B. COW (STREATHAM) LTD., rubber manufacturers, reg. office, 31 Kings Road, London SW3. C. E. Suram, 31 Kings Road SW3, appointed liquidator, 18 April, to succeed E. Phillips.

WEMBLEY RESINOIDS LTD., manufacturers of chemical products, reg. office, 31 Kings Road, London SW3. C. E. Suram, 31 Kings Road SW3, appointed liquidator, 18 April, to succeed E. Phillips.

### Notice of Meetings

BRADSHAW, TURBARD AND CO. LTD., reg. office: 3 Prebend Gardens, Chiswick. London W4. Chemical merchants. Creditors, 15 May, 10.15 a.m.; contributories, 15 May, 10.45 a.m.; both at room 401, 4th floor, Inveresk House, 346 Strand, London WC2.

## World Congress on Scientific Management

Senior executives from 27 countries will attend a conference in Paris from 24 to 28 June organised by the International Committee for Scientific Management. General theme of the congress will be 'Concrete achievements in the field of scientific management and future prospects in the light of technical and social achievements'.

Full particulars can be obtained from the British Institute of Management, 8 Hill Street, London W1.

## NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sale Branch), 25 Southampton Buildings, Chancery Lane, London WC2, price 2s 6d including postage; annual subscription £6 6d.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

### ACCEPTANCES

Open to public inspection on 12 June.

- Preserving perishable liquids. Kazmi, M. A., 776 688  
 Polystyrene. Distillers Co. Ltd. 776 689  
 Boron nitride materials and shapes. Carborundum Co. 777 000  
 Quaternary tropeine compounds and processes for their preparation. Boehringer, A., Boehringer, E., Liebrecht, I., and Liebrecht, J. (trading as Boehringer Sohn, C. H.). 776 690  
 Reduction of substances by means of a liquid amalgam. Naamlooze Vennootschap Koninklijke Nederlandsche Zout-industrie. 776 629  
 Production of protective layers on surfaces of metals. Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. 776 954  
 Liquid-phase oxidation of cyclohexane. Du Pont de Nemours, E. I., and Co. 776 803  
 Basic ethers of carbinols substituted by endocyclic groups. Thomae, Dr. K., Ges. 776 693  
 Complex esters suitable for use as ashless detergent additives for lubricating oils. Esso Research and Engineering Co. 776 955  
 Apparatus for detecting radioactivity. Francais Etat. 776 576  
 Process for the retanning of mineral pretanned leather. Koppers Co., Inc. 776 956  
 Synthetic elastomers. Farbenfabriken Bayer AG. 776 805  
 Dialkylamino derivatives. Morren, H. 776 705  
 Organosilicon compounds. Midland Silicones Ltd. 776 706  
 Polyamides. California Research Corp. 777 007  
 Feeder device for viscous liquids. Körber, K. 776 709  
 Dust separator and a dust collector apparatus. American Air Filter Co. Inc. 777 009  
 Magnetic materials of the ferrite kind. Centre National de la Recherche Scientifique. 776 710  
 Polyazo dyestuffs and their metal complex compounds. Sandoz Ltd. 776 711  
 Aminoalkyl esters. Rohm and Haas Co. 776 712  
 Fibre-reinforced rubber articles and compounds for use in the production thereof. Monsanto Chemical Co. 776 910  
 Unsaturated carbonylic compounds. Naamlooze Vennootschap de Bataaf-sche Petroleum Maatschappij. 777 010

- Flame-resistant elastomer compositions. Goodrich, B. F., Co. 776 807  
 Reducing aromatic nitrogen compounds. Allied Chemical and Dye Corp. [Addition to 701 128.] 776 716  
 Derivatives of mandelic acid and their salts. Thomae, Dr. K., Ges. 776 717  
 White discharge print effects on fabrics dyed with vat dyestuffs. Badische Anilin- und Soda-Fabrik AG. 776 721  
 Carbides such as titanium carbide, boron carbide or zirconium carbide. Norton Grinding Wheel Co. Ltd. 777 013  
 Optically active glutamic acid. Pfizer, C., and Co., Inc. 776 722  
 Poliomyelitis vaccine products and methods for preparing same. Parke, Davis and Co. 777 018  
 Producing a metal-to-glass joint. Philips Electrical Industries Ltd. 777 020  
 Cyclopentanophenanthrene compounds. Syntex SA. 776 858  
 Compounds comprising 3-sulphanil-amido - 6 - substituted pyridazines. American Cyanamid Co. 776 730  
 Colour stabilisation process for copolymers containing acrylonitrile. Dow Chemical Co. 776 915  
 Pantothenyl alcohol. Opfermann, A. C. J. 776 733  
 Separating dust or liquid drops from a gaseous medium or from a mixture of gas and vapour. Aktiebolaget Svenska Flaktfabriken. 776 917

## FOR YOUR DIARY

### MONDAY 13 MAY

CS—Durham: Lecture Room 239, University Science Laboratories, South Road, 5.15 p.m. 'Chemical evolution' by Professor J. D. Bernal.

### TUESDAY 14 MAY

CS—Glasgow: Chemistry Department, University, 4 p.m. Centenary lecture. 'Structural evidence regarding the solid addition-compounds of ethers and amines with halogens and other molecules acting as electron acceptors' by Professor O. Hassel.

SCI (Agricultural Group)—London: Royal College of Science (Imperial College), Imperial Institute Road SW7, 10.30 a.m. Annual general meeting followed by full-day meeting: 'Use of urea-formaldehyde resins as fertilisers' by Dr. G. W. Winsor, 'Mineral nutrition of carnations' by J. H. Messing, 'The pC value of soils and its effect on the tomato crop' by R. E. Butters, 'Experiments on bulb manuring at Kirtton' by J. Wood, 'Experiments on bulb manuring at Rosewarne' by F. W. Shepherd.

SCI—London: 14 Belgrave Square SW1, 5.30 p.m. Joint meeting of Chemical Engineering and Plastics and Polymer Groups. 'Some new chemical and physical aspects of polyester resin technology' by L. H. Vaughan.

### FRIDAY 17 MAY

CS—Exeter: Washington Singer Laboratories, Prince of Wales Road, 5 p.m. 'Reduction by metal-ammonia solutions' by Professor A. J. Birch.

## TRADE NOTES

### Chemicals Approved

Ministry of Agriculture, Fisheries and Food announce that the only chemicals so far officially approved for sterilisation of farm dairy utensils are certain named brands of sodium hypochlorite solution. Other materials, including some quaternary ammonium compounds, are under examination, and when any of these are approved for use a further announcement will be made by the department.

### Shell Curing Agents

'Epikure' is the new name given to the range of six curing agents for liquid Epikote resins which are part of the Shell Chemical Company's customer service in resin sales. The range of Shell curing agents will then be Epikure MPD, DDM, 2, K.61B, T, BF<sub>3</sub>-400. Information on the properties of the Epikure range can be obtained from a bulletin, 'Curing Agents for Liquid Epikote Resins,' produced by Shell Chemical Co. Ltd., 15/17 Great Marlborough Street, London W1.

### New Telephone Numbers

The telephone number of Londex Ltd., Anerley Works, 207 Anerley Road, London SE20, is now Sydenham 3111. The number of the main works for buying enquiries and processing orders is now Sydenham 6258.

### New Branch Office

A new branch office opened by Honeywell-Brown Ltd. at 5-7 New York Road, Leeds 2, will handle all inquiries concerning industrial instrumentation, heating and air conditioning controls, and precision switches.

### Rocol Northern Sales Area

A northern sales area has been set up by Rocol Ltd., Swillington, Leeds, manufacturers of molybdenum disulphide industrial lubricants, with Mr. S. Lumb as the northern area sales manager. The area includes Yorkshire, Lancashire, Durham, Nottinghamshire, Derbyshire and Leicestershire. Mr. Lumb will work from the Rocol head office at Swillington.

### Changes of Address

Registered office of Alcock (Peroxide) Ltd. moved on 29 April from Chaul End Lane to Leicester Road, Luton, Beds, to which all correspondence should be addressed. Telephone number and telegraphic address remain unchanged and the works address for the receipt of goods remains at Chaul End Lane, Luton.

Transfer of their production facilities to their new headquarters at Holme-thorpe Avenue, Redhill (Redhill 4304), completes the second stage of the move made by Safety Products Ltd. Last summer the warehouse and offices were moved from Hatton Garden, London. Previously production was carried out at Carshalton. Better facilities for the production of Pulsafe industrial respirators, faceshields, goggles and spectacles and greater storage space are the principal benefits of the move. The London office has now been closed.



**Market Reports****EXPORT TRADE CONTINUES GOOD**

**LONDON** There has been a steady call for deliveries against contracts and a fairly active spot demand on home account. Export trade in chemicals continues to make a satisfactory showing and there is a good volume of overseas inquiry in circulation. Among the soda products there is a good call for yellow prussiate, chlorate and the hyposulphites of soda, while a good inquiry is also reported for borax, boric acid, formaldehyde and hydrogen peroxide.

Following the decline in the price of the metal, lower basis quotations came into operation on 1 May for white lead and red lead. Dry white lead is £3 10s per ton lower at £142 15s per ton while red lead is £4 per ton lower at £137 per ton. The new price for litharge is £139 per ton. Prices elsewhere are steady with a firm undertone.

Among the coal-tar products cresylic acid continues in good demand both for home and export account and there is a steady call for the light distillates.

**MANCHESTER** Business in heavy chemical products on the Manchester market during the past week has proceeded on steady lines and there has been little sign of contraction so far as the aggregate movement of supplies of the alkalis and other leading heavy products against contracts is concerned. Home and shipping inquiry has been on a fair scale, mostly relating to near delivery positions. The general undertone as regards prices continues firm. Conditions

are quieter in the fertiliser trade as is usual at about this time of the year. A steady demand for most of the light and heavy tar products is reported.

**GLASGOW** Business has been fairly active during most of the week in the Scottish heavy chemical market, and in particular, demands in regard to spot deliveries. Prices on the whole have remained firm, although some slight increases have taken place. A good flow of inquiries is being received for export, and the market continues favourable. Considerable interest from most sections is still apparent in agricultural chemicals.

**Bradford Laboratory Fire**

Fire which broke out recently in a laboratory at A. H. Marks and Co. Ltd., chemical manufacturers, Wyke Lane, Wyke, Bradford, was said to be caused by the firing of a solvent. The fire was brought under control by members of the staff and finally extinguished by the Bradford Fire Brigade. Nobody was injured but it was tentatively estimated the damage would amount to over £1,000.

**Fescol Ltd.**

The new plating plant installed by Fescol Ltd. at their Port Glasgow Works, for the deposition of hard chromium can handle components up to 5 ft. in diameter and not 5 in. as stated in *CHEMICAL AGE*, 27 April, page 711.

**Exhibition of MSE Laboratory Centrifuges**

THIS MONTH an exhibition of MSE laboratory centrifuges is being staged by Measuring and Scientific Equipment Ltd., at their headquarters in Spencer Street, London SW1. Their complete range of standard and special duty centrifuges is on show, in addition to which two new items and one redesigned model are displayed.

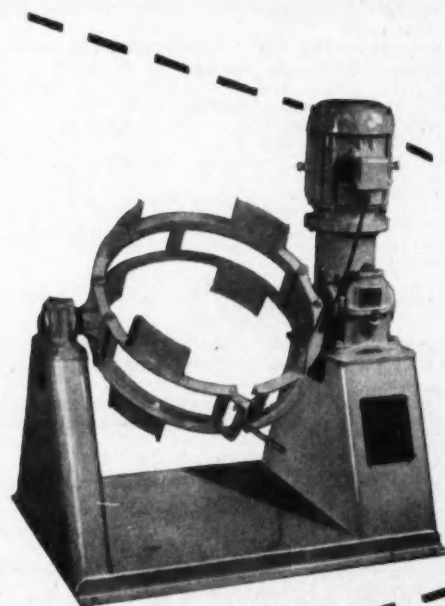
The MSE model 1 chemical centrifuge has been redesigned and a model 2 with a maximum throughput of 150 galls per hour compared with 45 galls per hour for model 1 has been introduced. Both these models provide the means of dehydrating solid or semi-solid matter, of clarifying liquids by the removal of solid suspensions and of the recovery of solids from suspensions. They are suitable either for experimental or small-scale production purposes.

Also shown is the prototype of the newly developed MSE soil grinder, approved by the Ministry of Agriculture Research Station at Wye, Kent.

The exhibition is open until the end of this month.

**US/UK Fibre Conference**

The Textile Institute is to hold a joint conference with the American Fibre Society in Boston, US, in September of this year. Six distinguished British authors have offered papers which will be 'of the greatest interest to scientists all over the world'. This was stated by Mr. Geoffrey Loasby (British Nylon Spinners Ltd.), chairman of the council, at the Institute's annual meeting in Huddersfield.

**TUMBLEMIX**

*... the perfect blending unit*

Leading Chemical Manufacturers in many parts of the World are finding the Tumblemix highly satisfactory for colour dispersion, powder mixing, paint agitating and rejuvenating etc.

Available in single or double Units, the Tumblemix is manufactured in sizes to take drums ranging from 1 to 40 gallons.

Leaflet available on request.

**P. & L. MILLER LTD.**

**HENEAGE STREET, BRICK LANE, LONDON, E.1**

TELEPHONE . . . . . BISHOPSGATE 7314 (5 lines)

# Classified Advertisements

**CLASSIFIED RATES:** All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to mid-day Tuesday for insertion same week.

**SEMI-DISPLAY:** 30/- per inch. Three or more insertions 25/- per inch.

**SUBSCRIPTION:** Annual Subscription of 52/6 brings 52 weekly copies of **CHEMICAL AGE** direct to your address from the printer (postage paid by the publishers), and a copy of **CHEMICAL AGE YEAR BOOK**.

**COMPANY MEETINGS AND REPORTS:** £12.12.0 per column. Three column measure (approximately 360 words).

## EDUCATIONAL

**A.M.I.CHEM.E.**—More than one-third of the successful candidates since 1944 have been trained by T.I.G.B. All seeking quick promotion in the Chemical and Allied Industries should send for the T.I.G.B. Prospectus. 100 pages of expert advice, details of Guaranteed Home Study Courses for A.M.I.Chem.E., B.Sc.Eng., A.M.I.Mech.E., A.M.I.Prod.E., C. & G., etc., and a wide range of Diploma Courses in most branches of Engineering. Send for your copy today—**FREE**. T.I.G.B. (Dept. 84), 29, Wright's Lane, London W.8.

## SITUATIONS VACANT

### EXPERIENCED CHEMISTS OR CHEMICAL ENGINEERS

required for research and development work in Chile, South America, in connection with expanding inorganic industry. Salary and duties commensurate with ability, training and experience. Excellent opportunity for establishing a permanent career. Three-year contracts provide travelling expenses and allow a three-month leave upon renewal. For further particulars and application forms, write to Box Y.204, c/o Streets, 110 Old Broad Street, E.C.2.

**CHEMICAL ENGINEER** required by Chemical Plant Manufacturers in Glasgow. A man with design and development experience is sought, conversant with the layout of complete processes and capable of supervising detailing for manufacture. Applicants with specialised knowledge would be welcome. Good technical qualifications are an advantage but sound practical experience will be considered favourably. The post is permanent and senior with good prospects, salary and provision for generous pension fund. Applicants should state qualifications, experience and salary expected. **BOX No. 3439, CHEMICAL AGE, 154 FLEET STREET, LONDON, E.C.4.**

## FOR SALE

Morton Whisking Machine container fitted water jacket 17 in. diam. by 24 in. deep. Fast and loose pulleys, 14 in. by 3 in. Exhaust Fan by Musgrave. 18 in. impellor, 17 in. suction, 13 in. by 13 in. delivery. R.O. bearings. Fast and loose pulleys, 6 in. by 3½ in.

**THOMPSON & SON (MILLWALL) LIMITED,  
LONDON, E.14.  
TEL. EAST 1844.**

**BOX NUMBERS:** Reply c/o "Chemical Age" • Bouverie House • Fleet Street • EC4

## FOR SALE: continued

### MORTON, SON AND WARD, LIMITED, STAINLESS STEEL VESSELS

**VESSELS** of all shapes and sizes, jacketed or unjacketed—with stainless steel mixing gear to requirements; also stainless steel storage tanks and vacuum vessels.

**"MORWOOD" "U-shaped" TROUGH MIXERS**—up to 2 tons, in stainless steel, with agitators, scroll or paddle type, jacketed or unjacketed.

**Stainless Steel TROUGHS, TANKS and CYLINDERS** made to requirements.

These items can also be fabricated in mild steel.

### JACKETED PANS

100g., 150g., and 200g., new, in mild, steel, for 100 lb. p.s.i. w.p.—with or without mixing gear.

**3 cwt. TROUGH MIXERS** by **CHALMERS** and **GARDNER**—stainless steel-lined troughs.

50g., 75g. and 100g. heavy duty **MIXERS** by **FALLOWS** and **BATES**. Agitators driven through bevel gear from fast and loose pulley.

200g. cast-iron **JACKETED MIXING VESSEL** with nickel-chrome impellor type agitator driven through bevel gears from fast and loose pulley.

**AIR RECEIVERS MADE TO REQUIREMENTS. PUMPS.** Selection of new **MONO** and second-hand Pumps in stock—2 in. to 5 in.

*Inquiries Invited.*

**MORTON, SON AND WARD, LIMITED,  
WALK MILL,  
DOBCROSS, NEAR OLDHAM,  
Lancs.**

Phone Saddleworth 437.

## 600

**TWO Filtration Plants** by Beth, 5 chambers, 40 bags, rated 2,000 c.f.m. at 100°C. Three bagging-off outlets, fitted motor-driven fan.

**Filtration Plant** by Beth, 10 chambers, 15 stockings each, total capacity 6,500 c.f.m. at 100°C. Geared motor units for shaker gear, motor-driven fan.

**GEORGE COHEN SONS & CO. LTD.,  
WOOD LANE, LONDON, W.12.  
Tel.: SHE. 2070.**

## PHONE 98 STAINES

42 in. Hydro 400/3/50 Underdriven (Lift out basket) (New) S.S. Jac. Pans 30 in. by 36 in. 40 w.p. (Two) (3) 2,000 gall. Cyl. Enc. Acid Tanks 35 w.p. S.S. Lined Autoclaves 6 ft. by 3 ft. 100 w.p. 26,500 gall. Sec. Cyl. Enc. Tanks 23 ft. 4 in. by 10 ft. deep. 'Z' & Fin Blade Mixers, Pans, Pumps, Condensers, Calorifiers, Refiners, Disintegrators etc. Complete lists available.

**HARRY H. GARDAM & CO. LTD., STAINES.**

## FOR SALE: continued

**600**

UNUSED Scott Patent Double-effect Vacuum Evaporating Plant. Evaporative capacity 4,500 lb. water per hour. Complete steel staging, stairway, platform, but excluding vacuum pump and motors.

Little-used Door Oliver Rotary Vacuum Filter, 5 ft. 3 in. diam. by 6 ft. long, fitted doctor scraper knife discharge, with vacuum pump, receivers, centrifugal pumps, piping, valves, and electrics.

GEORGE COHEN SONS & CO. LTD.,  
WOOD LANE, LONDON, W.12.  
Tel.: SHE. 2070.

- 12 Tons Neutronyx Detergent.
- 230 Tons Bitumen—in drums of 220 litres.
- 12500 Units Aeroplane Spark Plugs, new, A.C. type.
- 21 Tons Battery Chargers, selenium, new, high voltage, maximum 700 AH (ampere hours).
- 105 Tons Abrasive Cloth and Paper—American manufacture.
- 12 Tons Nitro-cellulose Lacquer and Varnish.
- 2 Mechanical Lathes, new, South Bend Brand—220-380 volts, automatic gear change.
- 2 Tons Products for Photograph Developing—black and white—coloured.
- 1 Crane—Michigan brand, new, 15-ton capacity.

Inquiries to:  
SOCOMO,  
43, RUE BEAUBOURG,  
PARIS 3e (Tel. ARC 52.74),  
FRANCE.

Three Sinex Electric Vibrator Screens 7 ft. 6 in. by 2 ft. 6 in., Rema Rotary Feeder and Air Separator. Carter Roller Crusher, Finger Mill. 16 in. Belt Trough Conveyor, 25 ft. centres. Vertical enclosed 4 in. Belt Bucket Elevator. "Hammamac" Swing Hammer Grinding Mill, also Massey Harris and Fyna Ditto. 40-gall Copper-lined Steam Tilting Pans.

A. H. KIMMINS & SONS LTD.,  
LYNDHURST ROAD, WORTHING

STAINLESS VAT, 200 gallons, with Revolving (Tinned) Coil.  
STAINLESS "Z" MIXER, 29 in. by 27 in. by 22 in. with Trough Outlets.  
PEERLESS 80 qt. 4-speed Electric Cake Mixer.  
ALITE SIFTER-MIXER, 500 lbs. capacity.  
HORIZONTAL RIBBON BLENDER, 8 cu. ft. Gas Heated.  
MORTON No. 3 Duplex "Z" Mixer.  
WINKWORTH MACHINERY LTD., 65 High Street, Staines.  
Telephone 1010.

## WANTED

INDUSTRIAL BY-PRODUCTS LTD., 16, Philpot Lane, London, E.C.3., will be pleased to receive particulars of any by-products, waste materials and residues for disposal.

## WORK WANTED &amp; OFFERED

PULVERISING of every description of chemical and other materials. Collections, storage, deliveries. THOMAS HILL, JONES, LIMITED, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3. (TELEPHONE : EAST 3285).

CRUSHING, GRINDING, MIXING and DRYING for the trade.  
THE CRACK PULVERISING MILLS LTD.  
Plantation House,  
Mincing Lane,  
London, E.C.2.

## WORK WANTED &amp; OFFERED: continued

GRINDING, CRUSHING AND GRADING  
FINE GRINDING LTD.,  
BLACKHOLE MINE, EYAM  
TELEPHONE: EYAM 227

## PATENTS &amp; TRADE MARKS

The Proprietors of British Patent No. 698,756 for "A METHOD OF RENDERING THE PHOSPHORIC ANHYDRIDE OF ROCK PHOSPHATE SOLUBLE IN CITRIC ACID, AND PRODUCTS OBTAINED THEREBY", desire to enter into negotiations with a firm or firms for the sale of the patent, or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58, Lincoln's Inn Fields, London, W.C.2.

## AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON (Established 1855).

Auctioneers, Valuers and Fire Loss Assessors of  
CHEMICAL WORKS PLANT AND MACHINERY  
York House, 12 York Street, Manchester.

Telephone 1937 (2 lines) Central Manchester.

## Rockets and Guided Missiles

By

JOHN HUMPHRIES

INTENDED in the main for engineers and technicians, this complete survey of present-day achievements and possible future developments presents the latest information on rocket motors and their applications from an engineer's point of view. Both solid and liquid propellant motors are discussed, the latter more fully as being of greater interest to the engineer. The first half of the book covers propellants, motors and components, the second, the applications of these motors to missiles and aircraft, and in conclusion a review of potentialities for the future is appended. The author has had wide practical experience following a brilliant scholastic career, and is at present actively engaged on rocket research.

31s. (postage paid)

Ernest Benn Limited  
Bouverie House · Fleet Street · London · EC4



*Metafilters secure the complete removal  
of suspended matter from any liquid  
at any temperature and pressure, giving an*

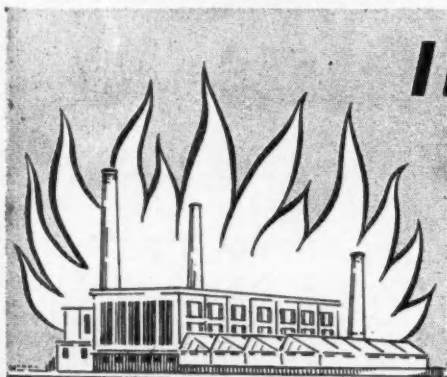
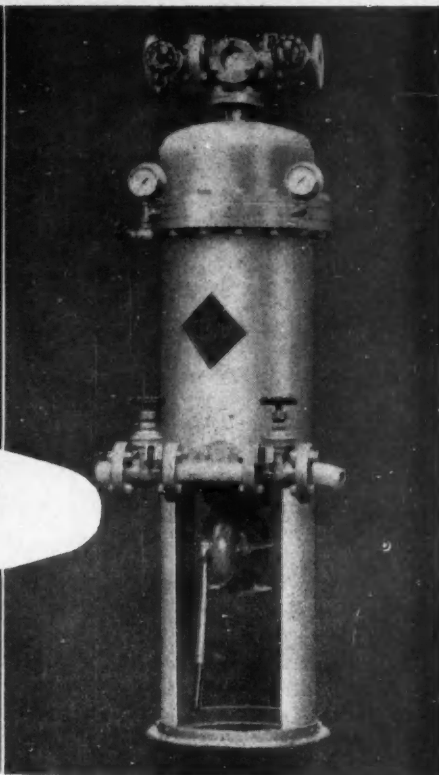
## OPTICALLY CLEAR FILTRATE

*without oxidation, loss of solvent, or escape  
of fumes. Can be completely cleaned in a few minutes  
without opening up. Constructed without  
soldering, brazing, or welding.*

### A TYPICAL **METAFILTER** INSTALLATION

*Sizes from 10 gallons to 10,000  
gallons per hour in any metal.*

**THE METAFILTRATION COMPANY LIMITED**  
BELGRAVE ROAD HOUNSLOW MIDDLESEX  
Phone: Hounslow 1121-2-3 Grams: Metafilter Hounslow



FILL IN THE FORM FOR A FREE SPECIMEN  
COPY AND SUBSCRIPTION DETAILS

THE MANAGER  
**FIRE  
PROTECTION  
REVIEW**

**BENN BROTHERS LIMITED,**  
Bouverie House, Fleet Street,  
LONDON, E.C.4., ENGLAND

## INDUSTRY must be **PROTECTED**

In the years 1952 to 1955 the estimated cost of fire damage was respectively, £24.3 million, £25.1 million, £26.2 million and £27.6 million, and of the total number of fires attended by Fire Brigades approximately 10,000 occurred in industrial and commercial premises.

The resultant interference with productive capacity and destruction of premises, stock and machinery might have been reduced by making works fire protection services more efficient and up to date.



**FIRE PROTECTION REVIEW**, recognised as the Technical Newspaper of the Industrial Fire Services, carries month by month, many features and articles of special value to executives in any way connected with Industrial Fire protection and extinction and safety measures.

Please send without obligation on our part, a specimen copy of **FIRE PROTECTION REVIEW** and details of subscriptions:—

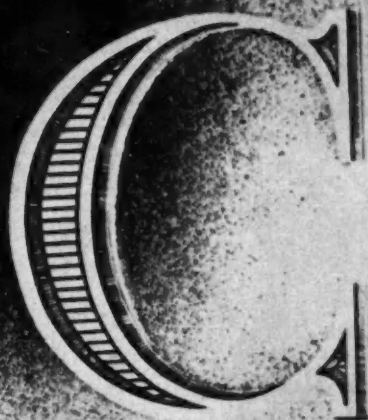
For attention of.....

Name of Firm .....

Address .....

Date .....

## ACTIVE CARBON



**DISCOLOURING**

**FOR CONDENSATION**

**AS CATALISATOR**

**FOR GAS ABSORPTION**

**FOR MEDICAL PURPOSES**

*is exported by*

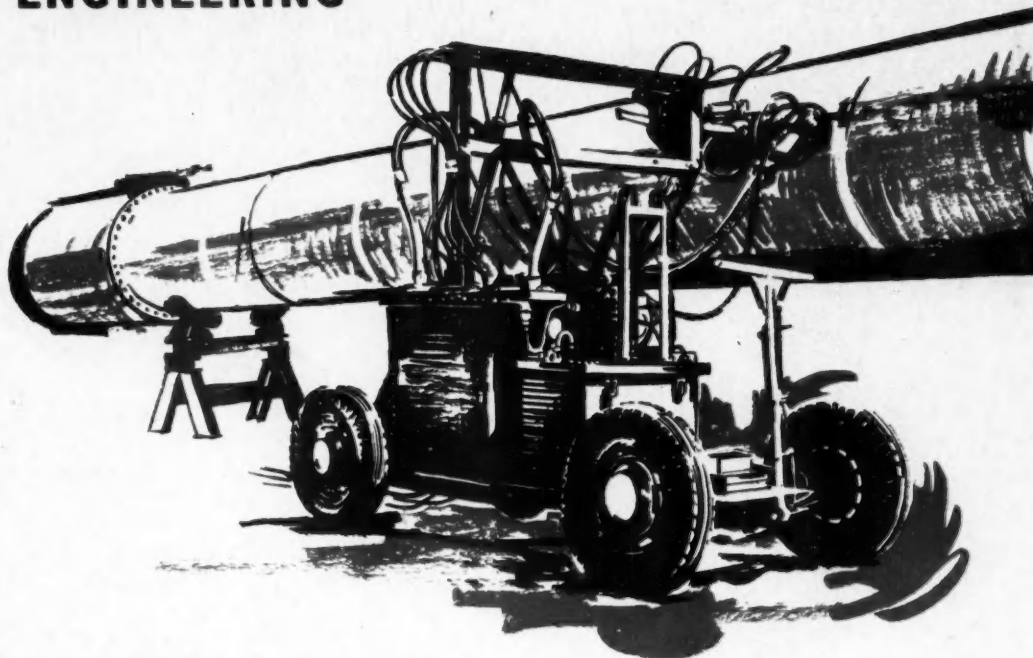
**Ciech** Limited

**Import & Export of Chemicals**

Poland, Warszawa. Tel. 690-01

Telegrams. CIECH—WARSZAWA. Tel. 690-01

## LEADERS IN FIELD ENGINEERING



This self-contained mobile radiographic unit is able to travel to any site for the critical examination of welded vessels, pipework, structures, etc. Within a short time of the radiographic examination being completed the film can be processed in the unit's dark-room, dried and examined. It makes available on hire, facilities to those sections of the engineering industry which find that the maintenance of a permanent radiographic department would not be an economic proposition. Write for descriptive brochure.



*Illustration above:—*

A 300 kV X-ray unit being used to examine a spiral-guided welded gasholder

*Illustration below:—*

The air-conditioned darkroom is provided with hot and cold running water and electricity is supplied by the unit's separate generating set



**THE POWER-GAS CORPORATION LIMITED**

AND

**ASHMORE, BENSON, PEASE & COMPANY**

STOCKTON-ON-TEES AND LONDON

AUSTRALIA • CANADA • FRANCE • INDIA • SOUTH AFRICA

298